

Three-Tiered Procurement Framework for U.S. Navy Waterfront Facilities

by

Christofer M. Collins

B.S. Civil Engineering

University of South Carolina, 1991


Submitted To The Department Of Civil And Environmental Engineering In Partial Fulfillment
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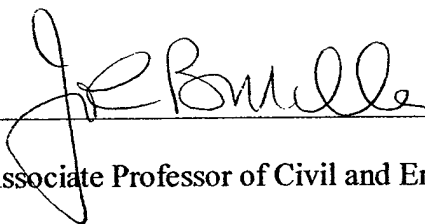
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Abstract

Supporting the ships and submarines berthed at United States Navy installations is a core capability and essential to mission-readiness. Over the previous ten years, Congressional discretionary spending, which keeps these facilities in operational condition, has been reduced to minimal sustainment levels, thus inhibiting the shore installation commander's ability to effectively manage their regions and support both United States and foreign fleets. Changes in Congressional membership, coupled with a change in Presidential administrations, has produced verbal commitments to fortify our military infrastructure in the hope of arresting, and even reversing, years of infrastructure deterioration.

Navy waterfront infrastructure is procured via contracting officers governed by the Federal Acquisition Regulations and subordinate instructions. This thesis proposes a *Three-Tiered* Framework to procurement packaging. Specific drivers are applied to eliminate unavailable contract delivery options. Private construction industry strategies are then applied to determine delivery method attractiveness. The combination of both is present as a framework for packaging Navy waterfront projects that are attractive to the private sector.

Through analysis of the worldwide data and discussions with OSD, Chief of Naval Operations (CNO) staff, and interviews with over 40 senior naval personnel and industry leaders; four representative bases were modeled against the *Tree-Tiered* Framework. The installations selected are Naval Station Norfolk Virginia; Commander Fleet Activities Yokosuka Japan; Naval Base Ventura County California; and Navy Station Roosevelt Roads Puerto Rico. The bases include large, small, international, and a second base in the continental United States. All facilities are located in areas under direct United States Government control, with no Status of Forces Agreements or international charters that limit waterfront procurements.

The United States Navy Naval Facilities Engineering Command (NAVFAC) is chartered to provide engineering and mission support to the Secretary of the Navy and his Staff. Much of the Navy mission hinges on timely and innovative execution of congressional procurement legislation, as well as proposing revisions and alternatives. The framework of the NAVFAC authority, limitations, and procurement strategies are discussed. The application of regional support and mission objectives is addressed congruently with reduced funding parameters and regionalization. The selection of procurement delivery methods is discussed at great length, in terms of construction contracting drivers and industry advantages. Applying these concepts enables government procurement officials to craft attractive solicitations for future Navy waterfront facility procurements.

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LCDR (s) Collins was born in Saigon Vietnam, and is the son of a retired U.S. Air Force Master Sergeant. His childhood was spent at various U.S. military bases worldwide. He received a Bachelor of Science Degree in Civil Engineering from the University of South Carolina, and was commissioned in September 1991 as an Ensign through the Civil Engineer Corps Collegiate Program.

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LCDR (s) Collins attended postgraduate school at the Massachusetts Institute of Technology, graduating with a Science Masters degree in Civil and Environmental Engineering in July 2001. Upon completion of his degree, he reported to Naval Mobile Construction Battalion ONE to serve as the Operations Officer.

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LCDR (s) Collins is married to the former Olga Maria Fernandez of Santander, Spain. They reside in Gulfport, Mississippi, and have no children.

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1 INTRODUCTION

1.1 The State of American Infrastructure Development

1.1.1 American Infrastructure

The United States enjoys a \$3-Billion construction industry supported though public and private capital. The Presidential budget submitted in April 2001 shores up the Transportation Equity Act-21 by 8% and airport grants by 3%; however the overall reduction of federal appropriation towards infrastructure is \$2.8-Billion (ENR April 2001). Considering the American Society of Civil Engineer's Report Card for America's Infrastructure was a "D" in 1998 (ASCE 1998), the future predictions of sustainment for the \$10 Trillion (Miller 2000) in public and private infrastructure does not seem promising. The existing decay is not a sudden change, but rather a chronic result of years of neglect and lack of attention. Reductions in Government spending, comprising the backbone of our infrastructure, is one of the key contributors to this declination spiral.

The rapidly increasing economy has raised the expectations of the consumer to a standard of uninterrupted utility service and construction quality that is nearly unsustainable. As these expectations rise, the construction industry strives to build smart structures that meet the mission and do not burden owners with future funding anchors. With the drop in interest rates, the Commerce Department noted that February 2001 yielded the highest value of nationwide construction projects in America's history, valued at \$834.2-Billion (Avera 2001). Construction industry's attempt to meet consumer expectations adds to the infrastructure burden when operations and maintenance of the new facilities is not considered. Albeit the American standard of living is known to be one the world's highest, efforts to sustain this level are often not synonymous with the life-cycle obligations to operate and maintain the mounting infrastructure load.

1.1.2 Department of Defense Infrastructure

Department of Defense (DOD) infrastructure is undergoing similar challenges as that of the private sector. Management and sustainment of the 1980s infrastructure growth is the

nemesis of installation managers in each branch of service.¹ All the while, Federal budget reductions in defense allocations, nearly 35% from 1960 until 2000 (Miller 2000), exacerbates the problem. Prior year expenditures have historically acted as controls for out year budget projections. The Department of Defense (DOD) covets only 16% of the federal government allocations for fiscal year (FY) 2001, and out year projections though FY2007 shows only a 2% increase (Executive Branch 2000). This meager amount must support operational missions; the purchase of war-fighting equipment such as tanks, ships and aircraft; the pay and benefits of its active duty; and the facilities infrastructure that supports the national defense.

Over the past two years, the once splintered DOD facility management program has given leeway to an integrated approach. Each service possesses a key organization tasked with real property maintenance (RPM)² and is continually “doing more with less.” Each has established links between service retention, quality of life, and quality of workspace factors; while integrating these tangential criteria with the current infrastructure approach. This correlation has resulted in small incremental defense allocation increases; however, they fall short of effectively covering all facility requirements. Recent changes in Congressional membership, coupled with a change in Presidential administrations, has produced verbal commitments to fortify our military infrastructure in the hope of arresting, and even reversing, years of infrastructure deterioration. These integrated component infrastructure managers stand poised to execute once the funds are allocated.

1.2 Addressing the Issue

1.2.1 Navy Waterfront Infrastructure

The United States Navy (Navy) operates and maintains over 75 Piers and Wharves (P&W) worldwide (IWAR 1999). Each is critical to providing support for not only U.S. Navy ships and personnel, but also the international militaries that often use these facilities while underway for extended periods. In the continental United States (CONUS), P&Ws are located

¹ Service refers to the Army, Navy, Air Force, Marine, Coast Guard, etc. Also know as a department or component.

² Real Property Maintenance is one part of a naval facility's life cycle. The steps are Planning, Construction, RPM, Demolition, and Disposal.

on DOD property and the Navy enjoys the ability to make fairly independent³ decisions as to their functionality and use. Conversely, overseas installations are sometimes located on seeded property,⁴ host nation military bases, or leased facilities. Tied to this is the various funding streams use to upkeep the facilities. In each case, political relationships are frayed when the use of a military base does not dovetail with the objectives of the host congressional⁵ district. In these instances, the Navy does not always enjoy the capacity to act solely in its best interest. Michael E. Porter⁶ refers to these “institutional factors” (Porter 1985) in his book Competitive Advantage, the second of his management and economic trilogy. This thesis applies this concept when discussing Private Industry Strategy (Chapter 5), and its affect in the management of Navy P&W.

1.2.2 The State of Repair

United States Navy waterfront facilities are directly linked to operational readiness, and have thus far been shielded from indiscriminate cuts. However, reduced RPM funding has resulted in minimal maintenance and temporary fixes, which have produced systemic infrastructure deficiencies. Shore installation commander reviews identified P&Ws as barely meeting mission requirements with great efforts to do so (OPNAV N46 2001). Major achievements have been made in procurement, maintenance, and operations through integrated procurement strategies and supportive legislation. These achievements include savings by alternative delivery methods over traditional ones and reviewing facilities from a regional level, vice local. These gains are short lived and the overall facility condition indexes do not reflect an upward trend – only minimal sustainment at existing readiness levels. Consequently, sub-optimal sustainment funding has yielded the same results as arbitrary cuts. Funding must be addressed not only from steady inflows of support, but also increases that are greater than annual inflationary factors. The concept of the Facility Sustainment Model (FSM)⁷ is

³ Independent - as it is compared to overseas bases. It does not refer to local politics, Congressional favorites, or societal objections. These are, however, minor in comparison to Department of State and International Treaty requirements.

⁴ For the purpose of this thesis, seeded property refers to land that has passed from a foreign country to the United States Department of State for U.S. military purposes.

⁵ The term congressional district can be easily substituted with any local or state district.

⁶ Michael E. Porter is the C. Roland Christensen Professor of Business Administration at the Harvard School of Business.

⁷ FSM is a copyright R&K Engineering (FSM 2001). Its reference is used with permission of the CNO for Logistics Staff and R&K Engineering.

addressed in Chapter 3, as the course now charter by the Chief of Naval Operations. Appendix A provides a quick list of acronyms for the reader, as many of the terms are engrained in Navy culture and may not be common knowledge.

1.2.3 Private Industry Perspective

Navy procurements are historically viewed from the DOD self-perspective. To date, there is no Navy procurement stratagem that analyzes and incorporates private industry attractiveness into Navy procurements. Federal Acquisition Regulations mandate “full and open competition,” but the typical litmus test applied is the number of bidders, which does not always reflect an understanding of true industry drivers. This author feels that an appreciation of industry attractiveness to Navy procurements is compulsory. Without the Navy’s understanding of industry competitive advantage and profit motivations, construction leaders are hesitant to participate in the DOD procurement process.

1.3 Research Project

1.3.1 Thesis Objective

The objective of this thesis is to craft an intuitive and robust model, defined as the *Three-Tiered Framework*, which can be applied ubiquitously to naval waterfront procurements. Professor Christopher M. Gordon first crafted a general driver framework in his 1991 thesis, “Compatibility of Construction Contracting Methods with Projects and Owners” (Gordon 1991). These basic drivers have been proven and effectively applied through multiple industry case studies and projects from his class.⁸ However, there is no application of this framework specifically to naval waterfront procurements. In order to craft the *Three-Tiered Framework*, naval waterfront procurements were de-aggregated and craftily merged with private industry strategy and incorporated Gordon drivers. The importance of this work is to establish a framework that can be applied by U.S. Navy procurement officials globally, and where deliberate steps are suggested for waterfront infrastructure procurements. The resulting

⁸ Mr. Gordon is the instructor of the Massachusetts Institute of Technology course 1.472 Innovative Project Delivery Strategies in the Public and Private Sector.

contribution and uncharted research is the *Three-Tiered* Framework application to naval⁹ waterfront facility procurement.

1.3.2 Thesis Scope

This thesis synthesizes various approaches to construction industry economics and management. It begins with a description of the Navy procurement process and its framework of authority, in the context of waterfront infrastructure. This is translated into a listing of drivers that represent various aspects of the Navy procurement. Next, industry strategy is discussed and translated into representative drivers. All are then combined into the *Three-Tiered* Framework and applied to four representative Navy installations.

- Chapter 2 overviews the DOD infrastructure management, the mission of the Chief of Naval Operations, the objectives of the Naval Facilities Engineering Command, and efforts by MIT towards an integrated development system. Included are elements from Professor John B. Miller's¹⁰ quadrant framework and fundamental elements, both from his authored book, Principles of Public and Private Infrastructure Delivery.
- Chapter 3 discusses the extensiveness of Navy waterfront facilities. Cold iron support equipment, installation readiness, and utilities are discussed congruently with mission requirements. There is discussion of the Facility Sustainment Model, Investment Category Codes, and historical obligations, all of which indicate trends in future requirements.
- Chapter 4 introduces the driver framework that should be considered when selecting a contracting delivery method. Navy, Project, Foreign Country, and Finance drivers are defined. These drivers integrate the basic ones penned by Gordon, plus the original framework and drivers crafted by this author.
- Chapter 5 reviews the various economic and management strategies that industry considers when deciding whether to compete in a particular market. Michael E. Porter's Competitive Strategy, Competitive Advantage, and Competitive Advantage of Nations (Porter 1980, 1985, 1990, respectively) are used to outline the Market drivers of the framework.
- Chapter 6 synthesizes the drivers and industry strategy into the *Three-Tiered* Framework crafting waterfront procurement strategies.

⁹ The terms naval and Navy refer to two separate entities and are not used interchangeably. Naval refers to the U.S. Navy and U.S. Marine Corps combined. Navy refers to only the U.S. Navy.

- Chapter 7 provides an analysis of worldwide data and discussions with OSD, Chief of Naval Operations (CNO) staff, and the public works staff from each installation, where the *Three-Tiered Framework* is applied to four representative bases. The installations selected are Naval Station Norfolk Virginia; Commander Fleet Activities Yokosuka Japan; Naval Base Ventura County California; and Navy Station Roosevelt Roads Puerto Rico. The bases include large, small, international, and a second base in the continental United States. All facilities are located in areas under direct United States Government control, with no Status of Forces Agreements or international charters that limit waterfront procurement.

1.4 Conclusion

This thesis provides a procurement tool for waterfront infrastructure, which integrates an original driver framework and private industry considerations. It supports procurement process transparency that serves to widen the aperture of attractiveness to public procurements. The *Three-Tiered Framework* and applications demonstrate that the tools exist to craft procurement packages attractive to the private sector. This thesis proposes the framework that represents the compilation of research and incrementally improves the Navy's procurement strategy of waterfront facilities.

¹⁰ Dr. John B. Miller is an Associate Professor at MIT and co-author of the American Bar Association 2000 Model Procurement Code.

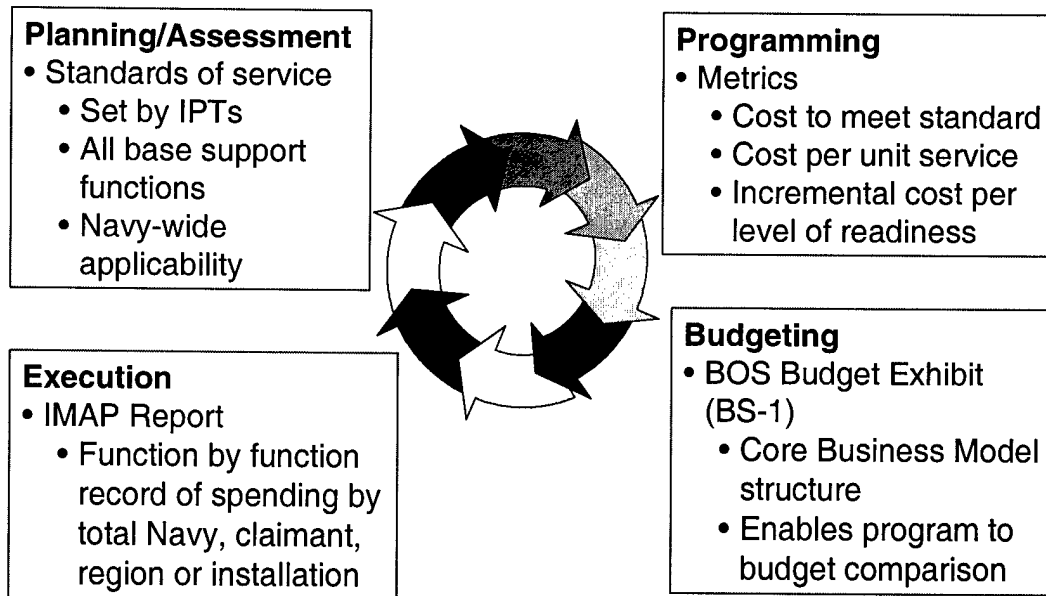
2 PUBLIC SECTOR INFRASTRUCTURE MANAGEMENT

2.1 The Department of Defense Overview

Each service component in the Department of Defense (DOD) staffs its own infrastructure management team. Their typical expertise is extensive to where they can provide direct support to the surrounding communities, and in some cases, is directly tasked with the area management of certain programs. The most prominent example is the Army Corps of Engineers regulatory jurisdiction over the nation's navigable waterway (U.S.C. 403). Allocations and appropriations¹¹ for each service to maintain facility conditions at serviceable levels occur in tandem with the cycles of operational funding streams. Consequently, it is this direct relationship that is often the precipitant to lower infrastructure allocations. A common anecdote used as a colander for funding allocations is the "tooth to tail" ratio, where the war-fighters and their equipment are "tooth," while infrastructure is only the "tail" that supports them. Though no formal ratio exists by instruction, the commonly subscribed adage is that the "tooth" should receive larger budget allocations than the "tail." Service component facility managers often compete head-on with operational commanders.

By and large, the DOD component management is through the planning, programming, and budgeting system (Installation 1999). During the planning/assessment phase, the global military requirements are assessed, and a strategy to meet the requirements is crafted. The programming phase translates these into alternative force structure programs in terms of personnel, material, and financing. The budget systems express these programs in the provisos of required allocations, and finally, the execution phase implements the plan. This is shown below in Figure 2-1.

¹¹ Appropriations are the designation of funds to certain programs. Allocation is the actual dissemination of funds that enables a program to be activated. The Anti Deficiency Act codified in 1976 does not allow programs to obligate funds until allocated.



BOS: Base Operating Services
 IPTs: Integrated Product Teams
 IMAP: Installation Managers Assessment Program

Figure 2-1 PPBS Cycle (CNO N4)

2.1.1 Budgeting Process

The Navy budget is aggregated into the larger DOD budget, and is forward to Congress via two major submission, the Process Action Memorandums (POM) and the Perennial Reviews (PR), where their occurrence is on even number and odd number fiscal years, respectively. The intention of each is to create out year capital programming objectives; execute reviews through fleet data calls; and revise the budget models based upon Congressional allocations and appropriations. Nested in each proposal is the facilities requirement to maintain and improve current readiness levels. In response to GASB 34 (GASB 34), each service has taken a more quantitative viewpoint of its facilities. DOD POM FY02 submissions are based upon facility condition indices independent of previous FY funding. Though a comparison to historical funding allocations is inevitable, the Navy Facility Sustainment Model (FSM 2001) and the Army Criteria Tracking System (ACTS 2001) are two examples of the facility planning systems that utilize a baseline real property database management to move forward. This is done by a bottom-up review of existing facilities. This

review is then passed to each of the Major Claimants¹² to verify that the facilities are mission necessary. Linkages to readiness are derived through a separate, but related, process by verifying need. Regrettably, the talented installation staff¹³ often tasked to do so is also managing day-to-day operations. This directly reflects in the available manpower effort invested into the competitive Navy budget cycle. It is this author's opinion that the resulting effect is the focus on delivering the most inexpensive procurement and not the methods to make the procurement attractive to industry leaders.

2.2 The Chief of Naval Operations Infrastructure Strategy

The Chief of Naval Operations for Logistics (CNO) is responsible for the oversight of all installations and facilities in the Navy. The programs are executed at the installation level through allocations which pass through the Federal Office of Management and Budget, to the CNO, through the Claimants, and finally to the installation commanders. The Naval Facilities Engineering Command (NAVFAC) is tasked with the management and upkeep of a wide array of naval infrastructure. The Shore Installation Management (SIM) program is used to provide consistent quality service across the Navy with measurable links to fleet readiness. Analogous with America's national infrastructure, CNO outlays to RPM¹⁴ has decreased over 25% from the years 1991 to present (CNO N44). Current CNO and NAVFAC goals are to arrest the years of the infrastructure decay.

The Facility Sustainment Model (FSM) and the Integrated Warfare Assessment Review (IWAR) are the cornerstone in capturing the fleet's infrastructure readiness. FSM collects existing infrastructure data and corrects errors to the master inventory list located in Washington DC. It incorporates items such as current plant value, replacement value, operations, and maintenance data, then aggregates these into future year projections. FSM is the cornerstone of the Navy's FY02 POM submission to Congress. IWAR serves a similar purpose, but represents the Navy Base Commander's interpretation of his facility's readiness, expressed in terms of C1 through C4.¹⁵ This is critical, as these un-quantifiable measurements have a direct correlation to the quality of work environment of the sailors. Congressional

¹² Claimants are the resource sponsors who request, receive, and allocate funds to the fleets, regional Commanders In Charge (CINC). Claimants are discussed in Chapter 2.2.

¹³ Normally this is the installation Public Works Officer and Comptroller.

¹⁴ Real Property Maintenance as defined in Chapter 1.

¹⁵ C1 through C-4 are defined in Chapter 3.

hearings utilize both the FSM and IWAR data to present a broader snapshot of infrastructure readiness, in the hope of coveting limited funds. Below is the breakout of fleet allocations by sector:

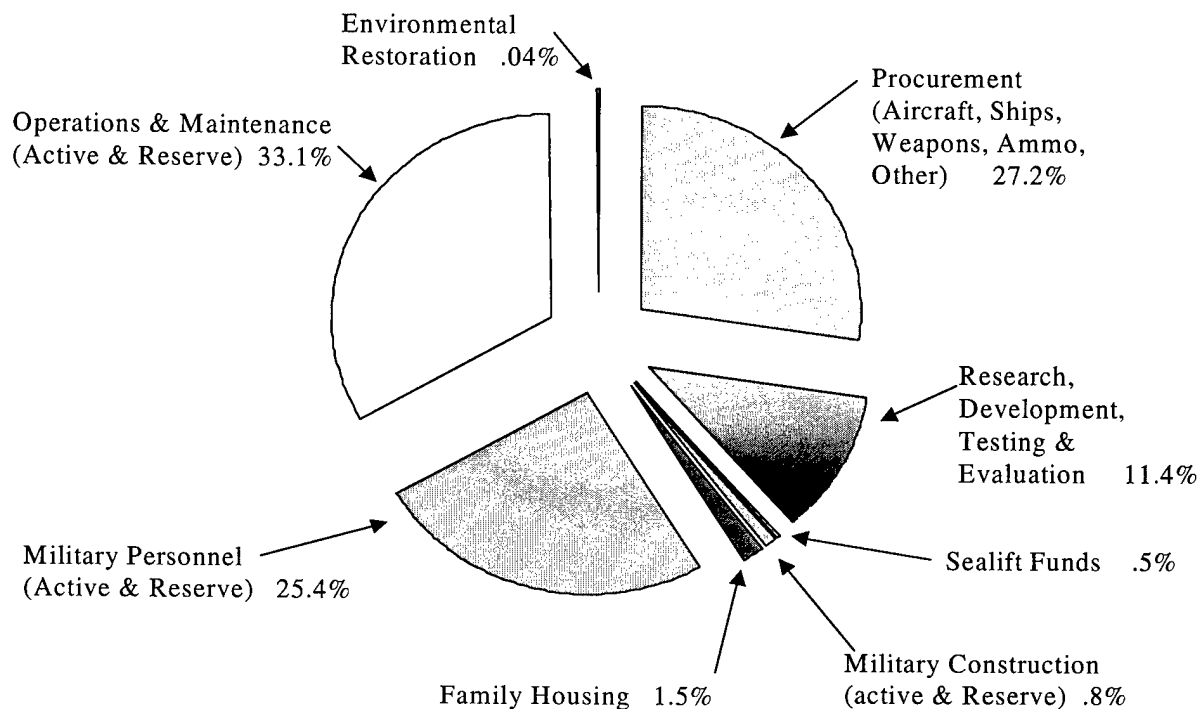


Figure 2-2 Fiscal Year 2002 Navy Breakout (CNO N80)

2.2.1 Regionalization

Additional budget cuts were made subsequent to the reductions in the global threat, savings associated with the Base Realignment and Closure, and strategic sourcing projections. In order to address this issue, Navy regional commanders have combine functions and are eliminating unnecessary redundancies, thus shifting the focus away from the individual installation viewpoint. Figure 2-3 on the next page shows the regional commanders and their areas of responsibility. The CNO goal is for regionalization to reach fruition within the next two fiscal years, and for the steady state model to govern Navy installations.

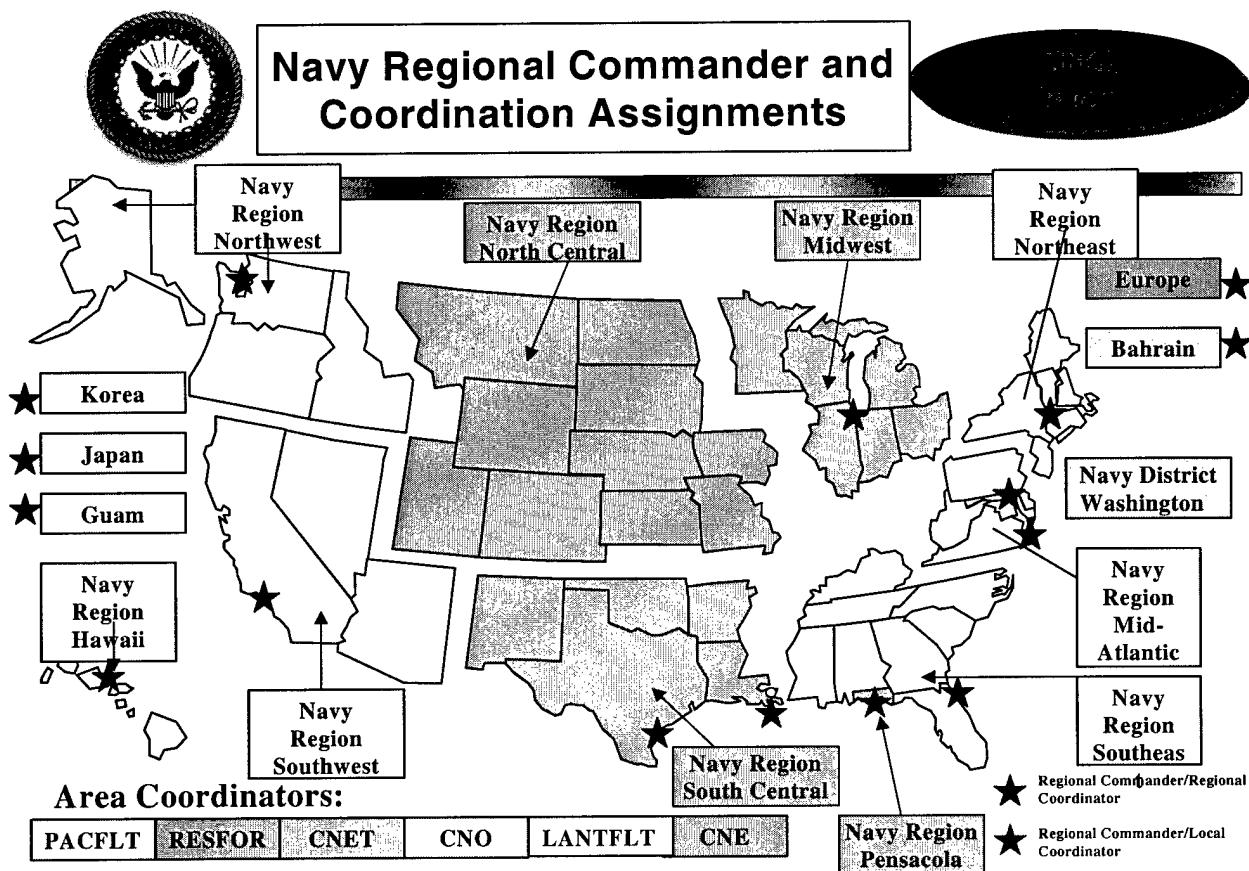


Figure 2-3 Navy Regional Commanders (CNO N4)

2.2.2 Reverse Integration

Regionalization affects individual naval bases as reverse integration in the private sector. Until 1996, naval bases operated under the umbrella of CNO guidance, but installation commanders possessed flexibility and budgets to act fairly independent of each other (Bartkus 2001). Analogous to the industry transformation, such as those undergone by Skanska¹⁶ and AMEC,¹⁷ smaller independent cells were assimilated by a larger corporate body and then aggregated into strategic business units. The immediate and clear advantage is the coordination within a region for limited resources, and elimination of redundant “tail” capabilities. Through leveraged savings against existing funding shortfalls and providing a focus on infrastructure, regional commanders are operating as skillful stewards of public funds. The primary

¹⁶ Presented by Mr. Claes Björk, President and Group Chief Executive Officer, SKANSKA AB, Sweden presentation on 08May 2001 at MIT

disadvantage has been the resistance from base commanders to relinquish their control to the larger region. Though, this has largely been overcome through the leadership of the CNO and Claimants. Navy reverse integration is yielding a more effective management of Navy infrastructure, specifically, transparency to the operational readiness of waterfront facilities.

2.3 NAVFAC Contracting Models

2.3.1 Delivery Methods Available

The purpose here is to briefly define additional attributes of each of the nine-delivery methods available to NAVFAC. The intention is to highlight specifics that have relevance in this thesis and their association with the drivers of the *Three-Tiered* Framework. The reader is considered to have sufficient knowledge in public procurements. For the sake of brevity, the delivery method name indicates the type of contract with the stipulations noted. No further description of each method is examined.¹⁸

- ❖ General Contractor Fixed Price (GC-FP): In this case, the contractor assumes all risk for the completion of the project and potential cost overruns.
- ❖ General Contractor Reimbursable (GC-R): The owner assumes all risk as all costs are passed through from construction.
- ❖ Construction Manager (CM): A firm acting on the owner's behalf is hired. This option is eliminated, as NAVFAC is a sophisticated owner. If necessary, the Navy is able to bring on additional personnel to cover any inability to manage a project.
- ❖ Multiple Primes (MP): NAVFAC has the sophistication to use more than one prime contractor on a single project. For purpose of this thesis, MP should not be confused with the Dual Strategy discussed in Chapter 2.4.8, as the project is segregated into separate procurements in the case of MPs.
- ❖ Design Build Fixed Price (DB-FP): This refers to the traditional method of construction and construction related procurements, where the contractor bears all cost risks.

¹⁷ 1.472 Final Project: The Rose Center CM Contract, On-site interview with Kay Jackson, AMEC Corporate Marketing Director, Construction Management, 1633 Broadway – 24th Floor, New York, NY 10019 – 6708, www.amec.com

¹⁸ Extensive descriptions of each method can be found in Gordon's thesis, "Compatibility of Construction Contracting Methods with Projects and Owners." (Gordon 1991).

- ❖ Design Build Reimbursable (DB-R): This also refers to the traditional method, where all costs incurred are passed through to the owner.
- ❖ Turnkey Fixed Price (T-FP): In this case, the contractor completes the design, construction and financing. He is paid at construction completion and assumes all risks.
- ❖ Turnkey Reimbursable (T-R): Similar to T-FP, the contractor is paid at the end of construction, but the owner assumes the cost risk, as they are passed through to the owner.
- ❖ Build Operate Transfer (BOT): This category includes any scenario that places the financing burden on the contractor, and not the owner. These include any combination of design build finance or design build finance operate.

2.3.2 Quadrant Frame Work

Miller defines the Quadrant framework in his book Principles of Public and Private Infrastructure Delivery (Miller 2000).¹⁹ The quadrants graphically represent the differences in combining infrastructure portfolios and the methods of funding. The Indirect axis refers to a “pull” strategy in which the owner provides no funds, and projects are funded through incentives, laws, or other dedicated streams. The Direct axis is when the owner provides funding to “push” a project through. The Segmented axis is a delivery method that has separate design, build, and construction steps. The Combined axis represents a project delivery method that integrates the steps in the procurement project into a single package. The Quadrant Framework is relevant in terms of crafting delivery method options in the four Applications in Chapter 7.

¹⁹ The Quadrants described are excerpts from Miller 2000. “Push” and “pull” concepts are taken directly from Miller 2000, pg. 32.

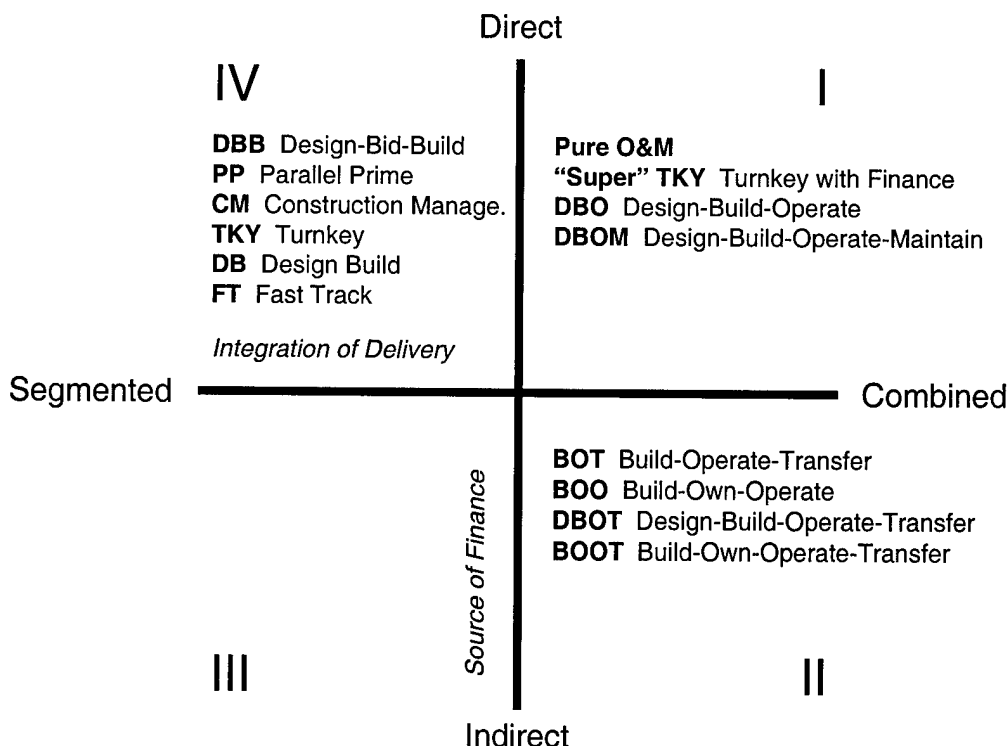


Figure 2-4 Operational Framework for Project Delivery Systems (Miller 1995)

2.3.3 Limitations to Delivery Method Options

The Federal Acquisition Regulations provide the legal boundaries by which each of the components procures products and services. Various Acts support the advancement of specific delivery methods²⁰ and act to steer the DOD procurement towards the usage of particular methods. Before 1949, Congress had used a dual-track strategy extensively. Dual-track in this case is the use of more than one delivery method on the same project portfolio to acquire infrastructure. Between 1949 and 1972, the Armed Service Procurement Act of 1947 required that design and construction be procure separately. The Brooks Act in 1972 required that design contracts be awarded based upon qualification and then price. Recently, the Clinger Cohen Act of 1997 (Clinger-Cohen 1997) promotes the use of a two step design-build methodology to deliver public infrastructure. Only three states prohibit design-build, while 17 states permit it with barriers and the remaining 30 states permit it full (ENR March 2001). The DB delivery methodology is being aggressively used in the Southern Division of NAVFAC, where significant numbers of projects are tested to benchmark efficiencies. The limitations that

²⁰ Historical public-sector legislation examples that follow are from Miller 2000 pg. 43-44.

currently stand today are evolving. Today's limiting laws could potentially be usurped if the savings and public benefit is so great, as to warrant Congress' revision.

2.3.4 Congressional Appropriation and Thresholds

Several budgetary thresholds limit DOD construction options and restrain NAVFAC procurement officials. These serve as triggers in which a higher authority must be involved in order to ensure that public funds are being executed smartly. As shown in Table 2-1, the Commanding Officer refers to the installation commander and the Major Claimant is the regional coordinator. Large Military Construction projects typically require the approval of the Secretary of the Navy (ASN), Deputy Secretary of the Navy (DASN), or the subordinate staff such as Installations and Environment (I & E). The table below summarizes the approval authorities and appropriations types for each Chief of Naval Operations program.

<i>Program</i>	<i>Category of Work</i> ^{Note 2}	<i>Fund Range</i>	<i>Approval Authority</i>	<i>Appropriation</i> ^{Note 1}
Locally Approved Projects	Maintenance ^{Note 2}	≤ \$1M	Commanding Officer	O&M,N ^{Note 1}
	Repairs	≤ \$1M		O&M,N
	Minor Construction	≤ \$400K		O&M,N
	Equip. Installation ^{Note 3}	≤ \$200K		OPN, APN, etc.
Special Projects	Minor Construction ^{Note 4}	\$400-\$500K	Major Claimant	O&M,N
	Maintenance ^{Note 2}	> \$1M	Major Claimant	O&M,N
	Repair	\$1M - \$5M		O&M,N
				OPN, APN, etc.
	Equip. Installation ^{Note 3}	> \$200K	Support Agent	
	Repair	> \$5M > \$500K & 50% of replacement value	DASN (I&F) Major Claimant	O&M,N
Military Construction Projects	Construction	> \$500K	Congress	MCN
	Real Property Acquisition	> \$500K	Congress	MCN
Military Construction Projects (Exceptions)	Unspecified Minor Construction (UMC)	\$500K-1.5M ^{Note 5}	ASN (I&E) and Congress	MCN (UMC)
	Emergency Construction	> \$500K	ASN (I&E) and Congress	MCN
	Restoration of Damaged Facilities	> \$500K	ASN (I&E) and Congress ASN, OSD and Congress	MCN
	Contingency Construction	> \$500K		MCN

NOTES:

1. For activities funded by O&M,N funds; maximum funding levels are shown.
2. Applies to specific maintenance, no limit on continuous maintenance.
3. Costs of work related to installation only; does not include procurement of equipment.

4. Limit is \$1,000,000 for construction projects intended solely to correct a deficiency that is life- threatening, health-threatening, or safety-threatening
5. Urgent Military Construction limit is \$3-Million for projects intended solely to correct a deficiency that is life threatening, health threatening, or safety threatening.

Table 2-1 Funding Threshold Authorities (CNO INSTR 11010.20F)

2.4 Fundamental Elements of Infrastructure Strategy

Miller defines ten fundamentals essential to producing robust, viable procurements that yield “stable, competitive infrastructure strategies” (Miller 2000, pg. 9).²¹ These elements are necessary to attract private sector interest in public procurement projects. They also ensure that limited public sector resources are wisely executed.

2.4.1 Government Defined Scope

The Owner, in this case the Navy, must be the one who defines the scope of work. This should not be done through the request for proposal (RFP), as it is near impossible to analyze the bids when the owner is unsure of its needs. The California Department of Transportation’s (CalTrans) replacement of its aging infrastructure, specifically the SR91 Express lane, is an example of where the government used the RFP process to define the scope of work. CalTrans supported the AB680 Bill, which provided a conduit for procurement of roadways. Lacking a defined scope of work, CalTrans requested qualifications and proposals. In this case it allowed the selection of projects to be decided after bids were received and the evaluators reviewed the various bid packages. Procurements with undefined government scope result in an unfavorable process for the contractor to submit proposals, an inaccurate evaluation system, and potentially a procurement plagued by litigation.

2.4.2 Head-to-Head Competition:

Once a scope of work is determined, the competition should be structured such that each bid can be compared on the same basis, whether they are qualifications, price, time, or other factors. NAVFAC service contracts are particularly sensitive to this aspect in light of the outsourcing initiative. As an example, the Executive Office’s Office of Management and Budget (OMB) committed the DOD to perform CA76 studies (CA76). The CA76 Program implements a policy announced by the Bureau of the Budget in 1955 that the Government will

²¹ Chapters 2.4.1 through 2.4.10 are concepts from Professor Miller’s book (Miller 2000).

rely on the private sector for goods and services when it is proper and economical to do so. The objective of the CA Program is to improve management and productivity through fair competition. The program works to establish cost-effective methods of obtaining goods and services, whether by streamlining in-house performance or contracting. Recent OMB guidance is that public entities need 18-36 months to complete the study, and at least 6 months following their conversion to a Most Efficient Organization (MEO) before being competitively waged against the private sector. NAVFAC delivery methods that incorporate base operating services should fully complete this cycle prior to bidding out the work. Since obtaining head-to-head competition between private sector firms and government in-house shops is near impossible, there should be a commitment to outsource, vice competing the two against each other. This is just one example of how difficult obtaining head-to-head competition may be.

2.4.3 Fair Treatment of Competitors

Public procurement officials must ensure that competitors have the same advantages. This is especially critical if the solicitation has many inquires. As a matter of practice, procurement officials should publicize each question and reply so that all party's involved in the procurement have the information.

2.4.4 Transparency

Each contractor must be able to view the process from conception to award execution, prior to submitting a proposal. This is critical so that contractors can choose to compete based upon an understanding of the procurement process. Miller cites that transparency is necessary for the participants, the procurement officials, legislators evaluating the system, and to the public whose funds are being used.

2.4.5 Safety Confirmed

The incorporation of design and construction in a single procurement, or single provider, requires that the owner ensure that an engineering safety check is completed. This is a common practice in Hong Kong, where an independent checking engineer (ICE) reviews contractor decisions to ensure that they are based upon sound engineering practices (Miller 2000, pg. 281-341). Safety confirmed does not infer that the ICE judges the contractor's

proposal, but rather as an independent review by a party who maintains fiduciary obligations to the owner.

2.4.6 Open to Technological Change

While public procurement officials may issue solicitations supporting innovation and technological change, award selections based upon the lowest bid price send conflicting signals to industry. Innovation rarely comes without a cost. Leaders in industry assume these costs within the private sector, as these are acceptable in doing business. Public sector responsibility does not place the same amount of importance on the exceptional performance that a new system may provide. Rather, acceptance is typically based upon the dollars saved or cost avoided.

2.4.7 Financial Analysis Over the Project Life Cycle

A complete review of the life-cycle financial aspect of a project is essential for procurement officials to understand the total impact that the selection of a delivery method will have. Miller, Steiner, and many others suggest that the equivalent uniform annual cost and the net present value of a project are indicators as to a project's viability. These also allow direct comparisons when analyzing different proposals, which may include various delivery technology or economies of scale.

2.4.8 Restoration of the Dual Track Strategy

The ability to execute project portfolios by different delivery methods is critical. At this time, the use of more than one method (i.e. dual track) on a single procurement is prohibited by legislation. Revision to the Model Procurement Code proposed to the American Bar Association (ABA 2000) allows the reinstatement of a dual-track strategy, by which public officials may use delivery methods in Quadrants I and IV along with those in Quadrant II simultaneously. Procurement officials would have the flexibility to resource-level various requirements amongst the delivery methods, which optimizes available funds and facilitates innovation. This has clear benefits for naval installation management.

2.4.9 Scenario Approach

This element advocates the creation of scenario models where variables are modified to produce a variety of net present values, revenue streams, and construction methods. By crafting a portfolio of different possibilities, owners may select one that meets their requirements, constraints, and available funding. Miller is the author of one such scenario model known as CHOICES®.²² The scenario approach was applied to the town of Medford Massachusetts and its infrastructure portfolio of approximately \$500-Million (Miller 2000, pg. 345). The result is the town's ability to perform sensitivity analysis by changing several variables such as tax revenue streams, federal or state revenue, or any of the other nine elements listed in this Chapter. Pursuant to the study, town managers are able to see an overview of their infrastructure and potential avenues to replace existing deteriorated facilities. Scenarios enable owners to compare alternatives and select the ones most advantageous to them.

2.4.10 Pace

The rate of infrastructure repair and replacement has a large bearing on the delivery of projects. One case example is in Hong Kong (Miller 2000), where the city had a suspense date of when it was to be turned over the Peoples Republic of China. Another case is when NAVFAC and the Navy European Installation Commanders chose to use their limited funding resources to recapitalize²³ entire bases, vice parsing out minimal allocations to each installation separately. The bases in order of recapitalization are Naples Italy, Sigonella Italy, Rota Spain; followed by the small bases at Souda Bay Crete and La Maddalena Sardinia.²⁴ By addressing all infrastructure needs sequentially, the Navy has leverage large scopes of work. Though the result has had a negative impact on smaller bases that are queued later, the leaders - Naples and Sigonella Italy, are able to attract international contractors and leading firms to participate in the procurement process. The Navy displayed commitment to the procurement, through large scopes of work for major installation modernization projects.

²² © Massachusetts Institute of Technology 1998 and 1999.

²³ In this thesis recapitalize refers to the complete restoration and modernization of all installation facilities.

²⁴ This order may change depending upon mission requirements and political desires.

2.5 Conclusion

This Chapter described the areas of public infrastructure management, its limitations, and elements that define prudent and effective execution methods. Evolving legislation, changing roles, the mission of the Department of Defense, technology advances, and the role of the naval fleet all help define the extent of needed infrastructure and the services that should be provided. These basic concepts are applied in Chapter 4 to form the *Three-Tiered* Framework.

3. SCOPE OF WATERFRONT FACILITIES REVIEWED

3.1 Situation

The Department of the Navy method for tracking, executing and portraying infrastructure requirements is in a state of transition. The greatest shift is the focus away from solely viewing *Quality of Life*. Future requirements are based upon the *Quality of Service*, which is the *Quality of Life* plus the *Quality of Work*. This has a direct impact on each installation. At the deck-plate level, the Chief of Naval Operations for Logistics (CNO) manages Navy real property through installation Public Works Officers (PWO). PWOs are directly responsible for a myriad of on and off installation clients and the contracts that support them. Historical costs are tracked through investment category codes (ICC). Navy infrastructure managers and private consultants are developing the Facility Sustainment Model as a result of GASB 34 and the need to incorporate a broader spectrum of effects that infrastructure influences. In the past, the Navy has presented its needs in terms of *Maintenance & Repair* and *Minor Construction*. While the term Minor Construction referred to projects typically under the Installation Commanding Officer's (CO) cognizance,²⁵ this misnomer led many to believe that Navy installations were erecting new construction without a regard for the increased operations and funds necessary to maintain them. The most notable change made is that these categories are now categorized as *Sustainment* and *Restoration & Modernization*. The terminology shift signifies the commitment by managers to life cycle facility management, and has led to a new accounting system and budgeting methodology for naval infrastructure.

This Chapter presents the background of Navy infrastructure management and introduces characteristics of the four representative naval installations: Naval Station Norfolk Virginia; Navy Station Roosevelt Roads Puerto Rico; Commander Fleet Activities Yokosuka Japan; and Ventura Navy Complex Oxnard California. Most importantly, it provides an overview of the daunting task in carefully crafting strategies to maintain and keep up the facilities at needed readiness levels.

²⁵ Installation CO's funding threshold limits are shown in Table 2-1.

3.1.1 Readiness Levels

Navy installation COs express their readiness in terms of a C-1 through C-4 rating. C-1 is fully operational. C-2 is meeting mission tasking with some deterrents. C-3 is barely meeting mission under great obstacles. C-4 is failure to meet missioner requirements. Table 3-1 below shows the overall Navy readiness level report by Major Claimants for FY 2000 (CNO N801). As recognized by members of Congress, the readiness levels of the operational facilities, including waterfront infrastructure is at a C-3 level. The similarity to private infrastructure is indicative by the lack of resource obligations applied to the most mission critical facilities. Readiness Level summaries provide condition snap-shots of the Navy and have lead to extensive congressional hearings on the preparedness of the U.S. Military Force.

	Operations & Training	Maintenance & Production	RDT&E	Supply	Medical	Admin	Community & Housing	Utilities & Grounds
PACFLT	C-3	C-3	C-3	C-3	C-3	C-3	C-3	C-3
LANTFLT	C-3	C-3	C-1	C-3	C-2	C-3	C-4	C-4
CNET	C-3	C-2	C-1	C-2	C-1	C-2	C-3	C-3
NAVEUR	C-3	C-3	N/A	C-3	C-2	C-2	C-2	C-3
CNO(FSA)	C-3	C-2	N/A	C-2	C-2	C-3	C-3	C-2
NAVAIR	C-2	C-3	C-3	C-3	C-2	C-2	C-2	C-3
NAVSEA	C-3	C-3	C-3	C-2	C-2	C-2	C-2	C-2
RESFOR	C-3	C-3	N/A	C-2	C-2	C-2	C-3	C-3
SSP	C-3	C-3	C-3	C-1	C-3	C-1	N/A	C-1

Table 3-1 FY00 Installation Readiness Report (CNO N80)²⁶

3.1.2 Integrated Warfare Assessment Report

Integrated Warfare Assessment Report factors are used to show the readiness of the critical infrastructure necessary to support wartime operations. Infrastructure in the C-3 or C-4 category, which are critical to the mission, must be programmed for replacement, restoration, or demolition. Appendices B through E²⁷ shows the status of the piers located at each of the four representative installations. All of the piers listed are actively used and the abbreviations

²⁶ A listing of acronyms can be found in Appendix A.

²⁷ This data is courtesy of CDR K. Schmader and LCDR M. Deibert on the Chief of Naval Operations for Logistics Staff, Washington DC. Reuse or dissemination of this information must be authorized by the same.

for the UIC, berthing type, and ship type can be found in Appendix B. A consolidated listing of the number of berths and nest can be found in Table 3-2 below.

	location	Nbr of berths	Nbr of Nests	Total
CONUS	Navy Station Norfolk, Virginia	30	52	82
OCONUS	Commander Fleet Activity Yokosuka, Japan	27	4	31
CONUS	Venture Naval Complex Oxnard, California	8	0	8
OCONUS	Navy Station Roosevelt Roads, Puerto Rico	10	0	10

Table 3-2 Consolidated List of Waterfront P&Ws (IWAR 2000)

From Appendix C, the readiness of Yokosuka Japan is predominately in C-1 and C-2, while Venture Naval Complex is all in C-3. There exists an obvious disparity between both, though each is located within the same Major Claimant. Interviews with the Venture Navy Complex Public Works Officer²⁸ note that the disparity may be in the seniority of the area commanders affecting the ability to levee funds; the location of the base; or a different funding strategy.²⁹

3.1.3 Investment Category Codes

The Navy Comptrollers track expenditures of real property infrastructure through investment category codes (ICC) (ICC 1978). Each ICC provides a Navy-wide standardized methodology for tracking the various classes of facilities. NAVFAC has the responsibility to maintain the ICCs and promulgates them through the NAVFAC P-72 (ICC 1978). The ICCs are listed in Table 3-3 below.

²⁸ CDR R. Clarke, Naval Base Ventura County, Port Hueneme, California.

²⁹ Yokosuka Japan, generally, does not receive Military Construction allocations. Under the Japanese Force Improvement Plan, the Government of Japan funds all Military Construction (JFIP 2000), to include waterfront facilities.

ICC	DESCRIPTION
1	Aviation Operational Facilities
2	Communication Operational Facilities
3	Waterfront Operational Facilities
4	Other Operational Facilities
5	Training Facilities
6	Aviation Maintenance/Production
7	Shipyard Maintenance/Production
8	Other Maintenance/Production
9	RDT&E
10	POL Supply/Storage
11	Ammo Supply/Storage
12	Other Supply/Storage
13	Medical
14	Administrative
15	Troop Housing/Messing
16	Other Personnel Support & Service
17	Utilities
18	Real Estate & Ground Structures

Table 3-3 Real Property Maintenance Investment Categories (RPM 2000)

3.1.4 Facility Sustainment Model Codes

The Facility Sustainment Model (FSM 2001)³⁰ focuses on the out year projections to sustain the facilities under the cognizance of the Military Service and Defense Agencies. FSM data feeds into the POM, PR, and Future Year Defense Plan (FYDP). The sustainment cost data includes maintenance and repair, inspections, preventative maintenance tasks, and emergency response and service calls for minor repairs. It also includes the routine life-cycle replacement costs based upon the year of construction. Unlike the historical expenditure data, the FSM does not include custodial services, waste disposal, central utilities, restoration, modernization, nor environmental impact costs. The full integration of the existing ICC and the new FSM will take several years. The two primary reasons for delay are disconnects between 'what is programmed' and 'how programs are executed';³¹ and to ensure fleet PWOs and Comptrollers are recording the expediters consistently Navy-wide. The overall

³⁰ Information presented in the section is an excerpt from the FSM Program. Future use or dissemination of this information is permissible only through written authorization from the Chief of Naval Operations for Logistics (OPNAV Code N4).

³¹ Claimants shift funds from where OPNAV programs dollars into must fund categories.

infrastructure inventory and costs are placed into Facility Analysis Categories (FAC) and compiled into similar groupings. The facility inventory is derived from the Naval Facilities Analysis Database (NFADB) and reviewed for accuracy prior to integrating the costing data. Out year FAC costs were derived as shown below:

$$\text{FAC} = \text{FAC COSTS} \times \text{Sustainment Inventory Factor} \times \text{Geographical Location Factor} \times \text{Fiscal Year Inflation Factor}$$

Equation 3-1 FAC Cost Equation

The primary FAC Codes used for waterfront data are listed below in Table 3-4. This data was collected for the four installations from an on-line database with access granted by the CNO N44.

DOD FAC	DESCRIPTION
1511	Pier And Wharf
1531	Marine Cargo Staging Area
1541	Shore Erosion Prevention Facility
1551	Small Craft Berthing
1552	Small Craft Building
1591	Miscellaneous Waterfront Facility
1631	Offshore Mooring Facility
1641	Harbor Marine Improvements
1371	Ship Navigation Building
1381	Ship Navigation Facility
1431	Ship Operations Building
2133	Marine Maintenance Shop
2134	Marine Maintenance Support Facility
2137	Fixed Crane Structure
2141	Vehicle Maintenance Shop
2145	Vehicle Maintenance Facility

Table 3-4 FAC Codes

3.1.5 Correlation

A correlation matrix was developed by the Major Claimants in order to convert the existing ICC data to the FSM format. The greatest challenges lay in the personnel side of the transition, as rooted in this method are changes to the Navy culture of budgeting. Historically,

inflationary factors were sufficient for comptrollers to divvy funds. The FSM requires an integrated approach by which the PWOs, comptrollers, and their staffs must work closer together in order to establish the various inputs of the FAC Cost equation. Table 3-5 shows the correlation between the two tracking systems for waterfront data.

ICC CODE	ICC SUB CODE	DESCRIPTION	DOD FAC	DESCRIPTION
IC03	7210	Wharves	1511	Pier And Wharf
IC03	7220	Piers	1531	Marine Cargo Staging Area
IC03	7230	Seawalls	1541	Shore Erosion Prevention Facility
IC03	7240	Dredging	1551	Small Craft Berthing
IC03	7260	Other Waterfront Bldgs & Facilities	1552	Small Craft Building
IC03	7270	Harbor and Coastal Bldgs	1591	Miscellaneous Waterfront Facility
IC03	75U0	Graving Docks and Drydocks	1631	Offshore Mooring Facility
			1641	Harbor Marine Improvements
IC04	71M0	Other Land Operational Bldgs	1371	Ship Navigation Building
IC04	7520	Liquid Fuel Dispensing	1381	Ship Navigation Facility
IC04	75W0	Ship Operational Facilities	1431	Ship Operations Building
IC07	71V0	Maintenance, Ships Spares	2133	Marine Maintenance Shop
IC07	7250	Production, Ships Spares	2134	Marine Maintenance Support Facility
IC07	7280	Graving Docks and Drydocks	2137	Fixed Crane Structure
IC07	7290	Marine Railways	2141	Vehicle Maintenance Shop
IC07	72A0	Shipbuilding Ways	2145	Vehicle Maintenance Facility
IC07	7590	Fixed Crane Structures		

Table 3-5 ICC to FAC Correlation

As can be seen from this table, waterfront facilities are divided into primary categories in the FAC systems that equate to several different ICCs for budgeting purposes. It is this disparity which creates confusion in the tracking of expenditures and future requirements, as applied in Chapter 7.

3.2 Mission

The mission of Navy waterfront facilities is to support the mission demands of today's fleet, the smart ships of the future, and includes the increased responsibility of Command, Control, Communications, Computers, and Intelligence (C4I) requirements.³² The capacity of Piers and Wharves (P&W) should be sufficient to support crane and storage loads and deliver utilities in sufficient quantity to support berthed ships and submarines. Structures shall take

advantage of technological advances such as composite piles and decks; and should be configured and conditioned so that there is minimal time for loading, off-loading, and ship maintenance. There should be minimal operational impact to cold iron support equipment (CISE),³³ weapon system testing, degaussing operations, dredging, or other evolutions that may render a part of the P&W unusable for a period of time.

For purposes of this thesis, the targeted infrastructure is the waterfront real property such as the physical pier, piles, and docks, as well as the CISE infrastructure essential to providing hotel services.

3.3 Execution

Navy infrastructure management is interwoven and dependent upon the war-fighter's requirements. A large impact on infrastructure requirements and readiness is anticipated due to impending fleet modernization. Evolutions in war fighting platforms include the design of the new destroyer, DD-21, the incorporation of the three existing classes of submarines into a single littoral warfare centric class, and the redesign of the amphibious fleet. Each development requires new ship to shore connections and alternations to P&W structures to accommodate new berthing configurations. More details on the platform evolutions can be found in Appendices F through H. Chapter 2 discussed the PPBS, POM, PR,³⁴ and the "tail" aspect of infrastructure administration. The transition has changed the way comptrollers track the budget in the Standards Account And Reporting System (STARS), and the method by which the CNO logistic managers balance frontline systems with the supporting infrastructure.

3.3.1 Historical ICC Expenditures

Data collected from the Major Claimants show historical expenditures for each of the four installations focused upon in this thesis. The ICCs pertinent to waterfront expenditures are ICC 03 Waterfront Operational Facilities, ICC 04 Other Operational Facilities, and ICC 07

³² The infrastructure mission is defined in the Commanding Officer's Guide to Public Works. The Naval Facilities Engineering Command (Installation 1999).

³³ CISE refers to the utilities that sustain a ship or submarine while berthed. This includes wastewater treatment, power, steam, potable and on-potable water, communication, etc. The term refers to the old steam ship's boilers, which provide the power for such services. Cold iron means the boiler is completely shut down and the ship relies on shore services completely.

³⁴ Plans, Program, Budget System; Process Action Memorandums, Perennial Reviews.

Shipyard Maintenance and Production Facilities. Chapter 7³⁵ provides an overview of the past four fiscal years of execution for the representative installations. It should be noted that Installation Commanders and Public Works Officers have wide latitude in defining the primary waterfront support infrastructure and the necessary collateral facilities. The data presented is representative and useful at the macroscopic level, however its aggregation to the system level³⁶ was not done, as it is not the scope of this thesis. One notable issue is that the Atlantic and Pacific fleets each manage their budget executions differently. In light of the current operational and training readiness being in a C-3 category (see Table 3-1), one can infer that the annual investments have only been sufficient to maintain operations, but not to restore or correct infrastructure deficiencies. The purpose of including historical expenditures in this thesis is to provide the reader an appreciation for the annual size of obligations, and to suggest areas to improve historical accounts tracking.

3.3.2 Future FAC Requirements

The FAC Costs have been audited by the Government Accounting Organization and requirements were forwarded to Congress earlier this year as a part of POM FY02. At the time of this writing, the CNO staff is working on PR FY03 and re-evaluating the factors used to compute the FAC Costs. These costs are presented in Chapter 7 congruently with the ICC data. Project FAC Cost will be used to produce an equivalent uniform annual cost (EUAC) in Chapter 7 as a part of the *Three-Tiered Framework*. In the scenarios presented later in this thesis, a facility is a strong candidate for replacement once the EUAC is at a minimum.

3.4 Delivery Method Administration and Logistics

NAVFAC procurement officers must balance a myriad of considerations when selecting a delivery method. Not only must regulations and best practices be considered; the impact to mission readiness and interruption to critical services must be weighed. Operational Commanders, such as ship and submarine COs, are typically not accustomed to the long lead time necessary in the facility procurement cycle. Quit often, waterfront procurements are characterized by extensive front-end engineering and design, longer approval and funding

³⁵ Expenditure data is courtesy of the facilities staff from the Commanders in Chief of the Pacific and Atlantic Fleets. The data source is direct fiscal downloads from the Standard Accounting and Reporting System (FM NPS 2001).

³⁶ For example, defining each building that contributed to each individual ICC expenditure balance.

processes, and construction schedules that necessitate interruption of services. The process from conception to delivery is typically longer than the two to three year CO tour, subsequently, many COs never enjoy the benefits of their initiatives while their successors must survive with their decisions. Overall, the administration of any delivery method by procurement officials is just as critical as the selection of technical design, product, or service specifications.

3.5 Command and Control

The Commanding Officer, with the input from his staff, should maintain positive control of the infrastructure located on their installation. In order to craft creative and attractive portfolios, the installation must know its current capabilities and its requirements. Quite often, waterfront facility usage expands, as each client demands additional space to operate. The result is redundant and, sometimes, unnecessary facilities. Also, abandonment and ownership in the case of demolition becomes a significant issue when replacement infrastructure is programmed. Each Navy installation has promulgated policies on facility moves, alternations, changes, etc. Some are mandated by DOD instruction, while others by good practice or local regulations. It is typically the Public Works Officer and his staff whom are tasked to coordinate facilities for the CO.

3.6 Conclusion

The intent of this Chapter is to provide the reader with an appreciation of the complexity involved with Navy installation management and the associated infrastructure. Specifically, budget management through ICC and FSM is demonstrated in Chapter 7 to highlight inconsistencies in management practices. This is built upon later in this thesis by the Application of the *Three-Tiered* Framework to the four installations discussed in this Chapter.

4 ESTABLISHING THE DRIVER FRAMEWORK

4.1 Introduction

This chapter establishes drivers for each area that is considered in the procurement of Navy waterfront facilities. Mr. Christopher M. Gordon penned the concept of drivers in the Massachusetts Institute of Technology copyright thesis "Compatibility of Construction Contracting Methods with Projects and Owners" (Gordon 1991). This chapter builds upon the general concepts presented by Gordon and creates a driver-oriented framework for the procurement of Navy waterfront facilities. The driver framework is then integrated with Private Industry Strategy (Chapter 5) in order to create the *Three-Tiered Model* (Chapter 6), which is the primary focus of this thesis.

4.2 Navy Drivers

Navy drivers review the ability to relinquish all, some, or none of the control in the procurement process, future operations, and maintenance.

- a. Requirement: The Navy must initially decide whether the facility is necessary for the mission, a required redundant capability, or a facility that can be demolished and deleted from the table of allowance. Technological advancements often make existing facilities obsolete.
- b. Force Protection: The facility must be reviewed for force protection criteria. Some facilities must be in a secured environment, even if located within a Navy Station's fenced area. In Naples Italy for example, the construction of the Command, Control, Communications, Computers, and Intelligence building is located within the secure perimeter of Naval Support Activity Cappodichino (Cappodichino 2001). Redundant security measures were implemented around the building inside of the base in order to control personnel access. Contractors required special security clearances beyond that of routine base access.
- c. Master Plan: Each naval installation worldwide contains a facilities master plan, based upon their required operating capabilities, that coordinates the mission and facilities. The project should be reviewed against the master plan. The impact of its construction should be incorporated into the base's facilities portfolio. This critical

step ensures that a single project delivery method does not usurp an existing facility nor that limited funds are not wasted on projects that do not fully integrate.

- d. Construction Sophistication (Gordon 1991): NAVFAC is considered to be a sophisticated owner, and possesses a high level of corporate contracting methodology knowledge. Should NAVFAC need to augment its capabilities, it can do so by temporarily hiring personal as deemed necessary, to include quality assurance inspectors, clerical staff, and engineers. NAVFAC P-1015 (Title II 1986) allows this, where public agencies are authorized by the Defense Acquisition Regulations to augment their staff with supervision and inspection of construction services, when deficient in a specific capability that is deemed necessary for proper contract execution. Ideal examples are when private sector proposals exceed NAVFAC technical inspection capabilities. Two common examples are the construction of system control and data acquisition (SCADA) monitors and specialty bilge-oily water treatment systems.
- e. Risk Aversion Modified: Though originally envisioned by Gordon (Gordon 1991) to be the financial risk an owner would be willing to incur on any particular project, this thesis applies a modify definition. For purposes of this thesis, the risk aversion is the ability to contractually control the project either during construction, operations, or maintenance. The Navy may chose not to employ a delivery method in which it loses control of the overall process.
- f. Restriction of Methods (Gordon 1991): Available delivery methods are defined in the Federal Acquisition Regulations and subordinate NAVFAC Instructions, and are continually evolving. Within the United States, the Brooks Act (Brooks 1974) requires public procurement officials to segregate design, build, and construction. Selection is based upon qualifications and not on price. At this time, the Clinger-Cohen Act in 1997 (Clinger-Cohen 1997) promotes the two step design-build delivery method. Currently, NAVFAC Southern Division executed 59% of its fiscal year 1999 contracts by design build (SouthDiv 2000). The inherent complexity of choosing a project delivery method on a global scale must be considered. Additional DOD restrictions at overseas bases may preclude the use of a particular delivery method and must be reviewed.

- g. Socio Economic Considerations: These programs are described in FAR Subchapter D (FAR Subchapter D) and allow the Navy to let contracts specifically targeted towards contractors who meet specified demographics. These include Small Business, Minority Owned Business, and Women Owned Business.
- h. Other Drivers: Changes in the political environment may add other drivers that need to be considered. Strategic alliances, either in CONUS or OCONUS, and shared efficiencies with other services could affect the drivers listed above.

4.3 Project Drivers

Utilizing the terminology discussed in Chapter 2.3.1 (Delivery Methods Available), this section discusses project drivers and the delivery methods that meet its requirements. This section proposes various drivers that directly affect a project's viability. One important note is that the construction manager (CM) delivery method is not applied in any circumstance, as NAVFAC maintains this capability. These are summarized below:

- a. Term of Facility Need: Although the most advantageous portfolios can be crafted by applying multiple year operations and maintenance, the term of the facility need affects the drivers by limiting the front-end period that the Navy is willing to wait for use of the facility. For example, only in unique circumstances would a method be employed that requires a year to deliver a project in use for solely six months. Though, suggesting an exact correlation is not the purpose of this thesis, the delivery method duration must meet the common sense test. Long-Term Facility Needs can be acquired through all delivery methods. Short-Term Facility Needs should only be delivered through GC-FP, GC-R, or MP, as the others required a significant amount of lead time to craft the contract and extensive general conditions that must be included.
- b. Time Constraints (Gordon 1991): The Navy must consider the time to delivery. Fastrack flexibility is not an option if the delivery method is DBB or GC-FP.³⁷ The Navy must also evaluate whether the time constraint is artificial or a bonafide need. An artificial time constraint is one that is caused by client convenience. A bonafide need may be due to mission change, operational requirement, or the result of a

³⁷ Unless the Navy is willing to pay acceleration costs.

legislative mandate. In the cases of an emergent need, the construction can be executed sole-source with the proper Justification and Approval (J&A). J&A approval authority is dependent upon the location, size, and emergence of the project.

- c. Political Environment: Waterfront construction is most likely to be within an U.S. military installation or area under its care. The Navy must be cognizant of the political climate and relationship between itself and the local community or host nation. To this extent, the Navy needs to maintain control of the contractor's physical presence and contractor personnel must adhere to the policies of the Navy base. All of the delivery methods permit site control by the Navy. Although, those using Fastrack could potentially have greater contractor labor on-site during overlapping construction phases. The crew size and access control must be considered when letting contracts in limited waterfront access areas.
- d. Flexibility Needs (Gordon 1991): In some cases, the Navy will need flexibility during the contract. Only the GC-R, GC-FP, and MP allow the Navy full flexibility as to the design. A lesser amount of flexibility is offered in the remaining delivery methods. Noteworthy is the fact that three specific general clauses are included in every Navy contract, to ensure it maintains ultimate control. These clauses are the Contract Modifications (FAR 43), Termination For Convenience (FAR 49.5), and Termination For Default (FAR 49.4).
- e. Design Process Interaction (Gordon 1991): The Navy must determine the extent of its involvement in the design process early. DB-FP, T-FP, T-R, and BOT contracts may reduce the Navy's control, thus the only incentive to design and functionality innovation is during post construction through potential award fees, positive contract closeout evaluations, and potential for future project considerations. An example of where this may be appropriate is the case of an office building to support port operations, where the Navy may chose to just hand off the performance specification to the contractor and allow him full control.
- f. Shared Capabilities: The focus of this driver is only on the operations and maintenance aspect after construction. As addressed in Chapter 2, regional bases are sharing facilities in hopes of gaining efficiencies. Shared Capabilities requires

that a review be done to consider whether a broader contract could be award to cover several facility requirements. The review also serves the purpose of ensuring that redundant services are not being contracted for on the same facility. The *only* contracting method that this driver is applicable to is the BOT delivery method, where operation and maintenance services could overlap with another facility. As defined in Chapter 2.3.1, BOT also refers to DBO and DBFO.

- g. Preconstruction Services Needs (Gordon 1991): This service is often deemed invaluable and leads to clearer scopes of work and reduced change orders after contract award. This is critical in cases where the Navy enlists a CONUS architect-engineer for an overseas base design. Additional costs may be necessary to bring the architects and engineers on-location for overseas site visits. Since MP and GC-FP allow limited Navy input in cost estimating, constructability advice, and value engineering (Gordon 1994), these do not meet the driver requirements.
- h. Financial Constraints (Gordon 1991): Chapter 2.3.4 discussed limiting thresholds by category of work. Congressional implemented programs, such as Military Construction, are funded by appropriations. Constraints imposed by Congress and the CNO must be considered, as this can potentially limit available contracting methods. Additionally, financial constraint must be reviewed as part of the project, as these will determine the method of obtaining Government funds.
- i. Security: NAVFAC is tasked to construct numerous facilities that are sensitive to national security. Projects in this category should be reviewed for limits to interaction and accessibility, both during design and construction. Necessary security clearances should be considered early on in the process to allow for adequate time for approval, or for it to be a disqualification in the Request For Qualifications.
- j. Manpower Displacement: This driver is applied when there are limits to manpower displacement, either caused by the contract scope of work or O&M that may be included in the procurement. Life cycle cost savings by the BOT deliver process could potentially displace a significant number of government employees. As such, a primary driver that incorporates socio-economic programs must be considered. Though not discussed in detail, human resource options include training, priority

placement, and relocation services. Also, the Executive Office's Office of Management and Budget details actions that public organizations should take to reach efficiencies and indicators that the private sector can perform the function (CA76). This driver considers that the contracting method cannot displace a significant number of government employees. Therefore, BOT may not be appropriate in some instances.

Below is a graphical summary of the drivers discussed and delivery method:

	GC-FP	GC-R	CM	MP	DB-FP	DB-R	T-FP	T-R	BOT
Long-Term Facility Need	X	X		X	X	X	X	X	X
Short-Term Facility Need	X	X		X					
Fastrack Schedule (Gordon 1991)		X		X	X	X	X	X	X
Sequential Schedule (Gordon 1991)	X	X		X	X	X	X	X	X
CONUS - Political	X	X		X	X	X	X	X	X
OCNUS - Political	X	X		X	X	X	X	X	X
More Flexibility (Gordon 1991)		X		X		X		X	
Less Flexibility (Gordon 1991)	X	X		X	X	X	X	X	X
Design Interaction (Gordon 1991)	X	X		X		X		X	
Less Design Interaction (Gordon 1991)	X	X		X	X	X	X	X	X
Shared Capability									X
Non-Shared Capability	X	X		X	X	X	X	X	X
Pre-Construction Advice Needed (Gordon 1991)		X			X	X	X	X	X
No Pre-const Advice Needed (Gordon 1991)	X	X		X	X	X	X	X	X
Financial Constraints	X	X		X	X	X	X	X	X
Security Constraints	X	X		X	X	X	X	X	X
Manpower Constraints	X	X		X	X	X	X	X	

Table 4-1 Project Drivers

4.4 Foreign Country Drivers

Country drivers address the un-quantifiable effects of political, economic, and foreign laws on the delivery methods that may affect construction. These drives are separate from the Private Industry Drivers discussed in the Chapter 5 and are only applied to overseas installations.

- a. Political Impact: Construction projects are politically sensitive to the host country. Some, such as Japan and Italy, have a formal process established for review of all new construction. Two examples are the Japanese Facilities Improvement Projects (JFIP) and the Italian Mixed Commission (Mixed Commission). Host nation approval must be considered in the delivery process, as it can affect time and cost.
- b. Foreign Laws and Restrictions: In locations where the naval base is located outside CONUS, local laws may limit the contract delivery methods available. The traditional methods of GC-FP, GC-R, and MP are available at every Navy installation. DB-FP, DB-R, T-FP, T-R, and BOT are dependent upon location. The best source to verify this with is the installation Staff Judge Advocate, the existing Status of Forces Agreement (SOFA), and the Department of State series on United States Treaties and Other International Agreement or bilateral agreements (FAR 25.8). This driver is related to the Restrictions of Methods, Chapter 4.2.f, as it applies to limitations during the execution of a contract and during award.
- c. Economic Factors: Since many DOD installations provide a significant impact on local economies, construction contracts that significantly affect the local economy need to be reviewed. The local and national economic impact of wide variations in contract awards should be reviewed before letting the work. This is crucial in remote or depressed overseas areas where the Navy base's presence sustains the local economy.
- d. Other Drivers: The overseas arena undergoes broad fluctuations and is highly susceptible to political risk. Other country specific drivers must be reviewed as necessary in order to balance the facility need with the available and approval methods.

4.5 Finance Drivers

These drivers are essential in crafting attractive portfolios to private investors. One vantage point of finance drivers is addressed by Steiner. He defines incumbent facilities as the *defender* and the replacement facility as the *challenger* (Steiner 1996). These terms are used to define the cost considerations when reviewing delivery options.

- a. Available Financing: Construction projects within CONUS can be categorized as being funded by a myriad of congressional appropriations. Navy procurement officers should review whether available funds exist or whether the contractor could potentially finance the work. Generally, the Navy financing capability is highly sensitive to reimbursable projects, and these should not be used when there are limited funds available. Some overseas installations receive local or other treaty organizational funding. These normally include lengthy approval processes and additional reporting burdens, which are placed on the staff executing the project. A contracting delivery method must be chosen that is flexible enough to account for this criterion.
- b. Equivalent Uniform Annual Cost (EUAC): On proven method for determining facility replacement is an analysis of the EUAC. The timing of infrastructure recapitalization is dependent upon the owner. Significant effort is put forth by public agencies to express their plight and fight for limited federal funding. For planning purposes, the economic life of a *defender* is met when the EUAC is at its minimum (Steiner 1996). At this point, the *challenger* should be considered as the viable alternative. It is at this minimum period that the *defender* should be replaced with the *challenger*. The chart below graphically depicts a general scenario.

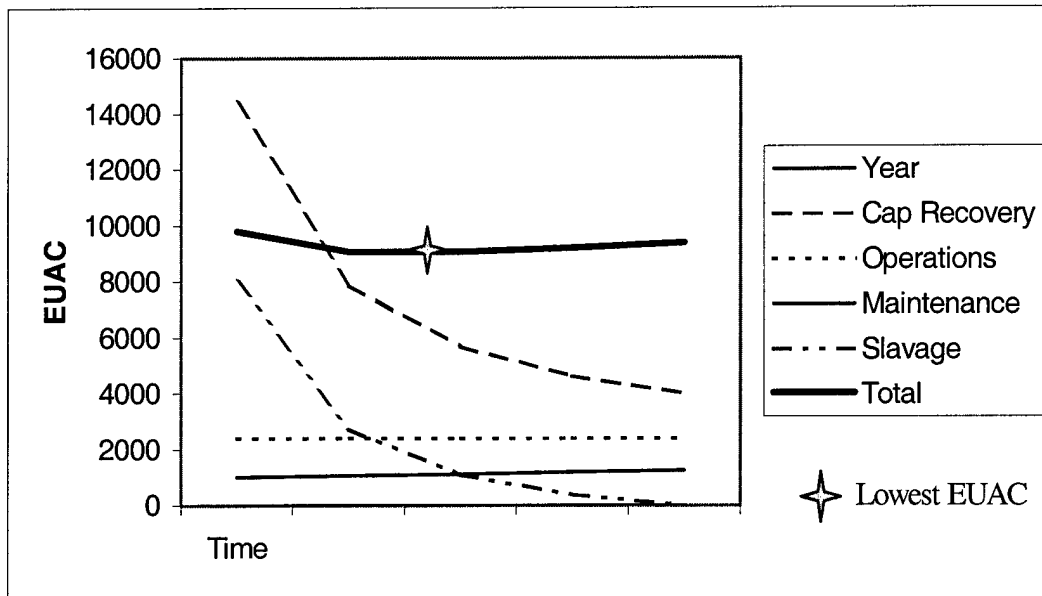


Figure 4-1 Equivalent Uniform Annual Cost

Framework Applications in Chapter 7 uses the EUAC concept and CNO data in an attempt to verify whether existing naval budget management methods allow procurement officials to determine a period for facility replacement. The Federal Office of Management and Budget audited the data used in the Applications of this thesis during the CNO Fiscal Year 2002 Process Objective Memorandum submission. The data has undergone a high level of scrutiny and though data aggregation to the building system level is not performed, the presumption is that its accuracy is sufficient to indicate a trend, if there is one.

- c. Regionalization: The impetus of regionalization is in response to budget reductions. It effects financing by enabling projects within the same region to be evaluated for efficiencies. While this primarily addresses material supplies, delivery methods that include facility operation will have an effect on existing regional operating service support contracts. A check of existing regional service contracts should be completed prior to award by a delivery method that includes operations.

4.6 Conclusion

There are multiple factors affecting the drivers listed in this chapter. Procurement officials must be sensitive to the political impacts of project delivery methods, as well as to the

contracting mechanics. The figure below depicts the Navy Drivers, Project Drivers, Foreign Country Drivers, and Finance Drivers.

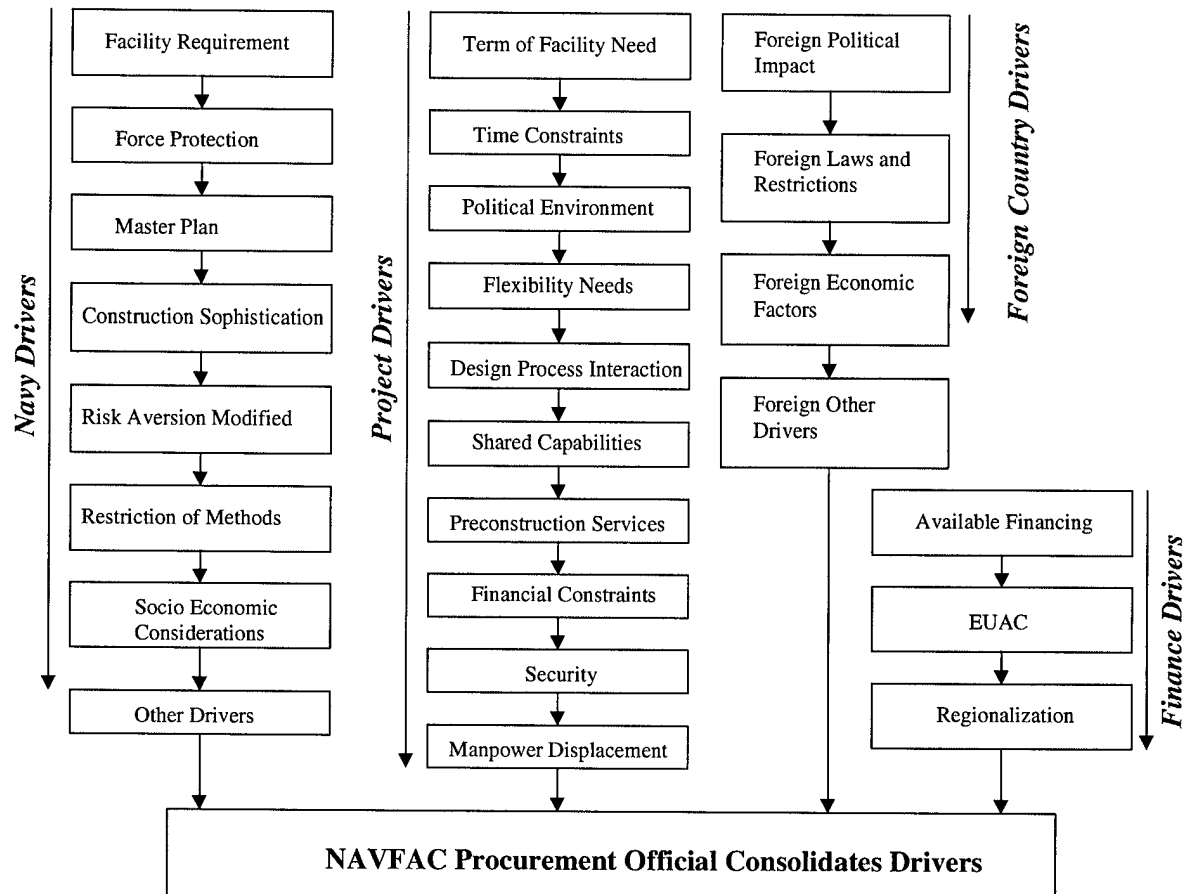


Figure 4-2 Driver Summary

Once the drivers above are reviewed and consideration given to each, NAVFAC contracting officers must ensure the delivery method selected meets the intent of the Federal Acquisition Regulations (FAR) and subordinated instructions. Additionally, methods not meeting the drivers should be identified at this point, but not eliminated. If the contracting officer finds no one method meets the drivers listed, then consideration must be given to modifying the procurement package. Unbundling the package and awarding by multiple prime contractors could potentially resolve conflicts. The drivers presented above are combined with the Private Industry Strategy (Chapter 5) to form the *Three-Tiered Model* (Chapter 6).

5 PRIVATE INDUSTRY COMPETITION

5.1 Introduction

Public sector understanding of private sector strategy is compulsory in crafting attractive solicitations and encouraging competition. The purpose of this Chapter is to focus the NAVFAC procurement team on the Competitive Strategy and Advantages of the leaders in the construction industry.³⁸ Regionalization, naval installation reverse integration, and crafting POM/PR based upon baseline facility evaluations have all lead to savings.³⁹ Though previous theses addressed the Porter⁴⁰ models, none so far have broached the potential of modifying the Navy's approach to procurement to gain industry's favor. This Chapter utilizes concepts authored by Porter to address industry motivations.

5.2 Industry Competitive Strategy

5.2.1 Five Forces Model

Porter's Competitive Strategy (Porter 1980) and Competitive Advantage (Porter 1985) concentrate on the industry and firms, respectively. Presuming that profit is the motivation for engaging in competition of a particular industry sector, the Five Forces Model (Figure 5-1) shows the interwoven balance amongst the competing forces. The Five Forces can be used to determine the profitability of the industry, as each affect the price, costs, and up front firm investment to compete (Porter 1980, pg. 5).

The construction industry is extremely fragmented and competitive, thus making profit margins uncertain and highly sensitive to new entrants, substitute products or services, and the bargaining power of suppliers and buyers. NAVFAC acts as a buyer of products and services from the construction industry. As such, its bargaining power in the mid-1980s time period could have been considered high, as it has virtually unlimited capital to procure mission essential infrastructure. However, thumbscrew⁴¹ management of defense budget allocations

³⁸ The term industry is used synonymously as any firm that competes in the construction value chain.

³⁹ Example: \$1-Million in annual personnel salaries for FY2000 in the San Diego Region alone (Bartkus 2001).

⁴⁰ Science Masters candidates in the Civil and Environmental Engineering Department previously completed many.

⁴¹ Thumbscrew is a common DOD term referring to artificially pushing resource to fenced programs, vice leveling them among all needs.

has eroded this power. Artificial budget fences and redundant bureaucracy have raised the cost of managing the infrastructure procurement process. NAVFAC procurement officials execute the best they can within the constraints given, and are procuring infrastructure based on the lowest bid. The result is the increased power of suppliers. They have switched, from being NAVFAC providers, to other clients that support higher returns on their investment with a lower risk than that allowed through FAR regulated procurements.

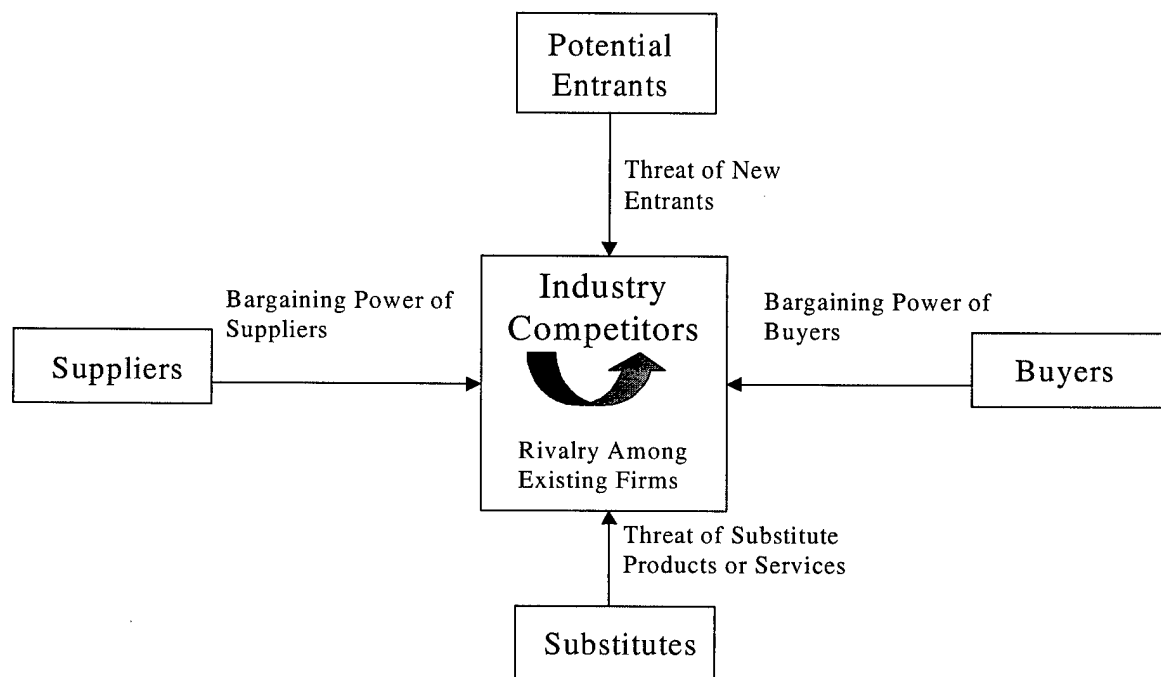


Figure 5-1 Forces Driving Industry Competition (Porter 1980, pg. 4)

Effective competition by industry participants is waged by their ability to influence each of the Five Forces.

5.2.2 Generic Strategies

Industry firms must establish a viable Competitive Strategy in order to sustain their market advantage. This can be achieved through three generic strategies: *cost leadership*, *differentiation*, or *focus* (Porter 1980, pg. 3). In order for firms to ensure their survivability, they must select an area in which to compete, ensure that the area barriers favor their own business, and ensure that their organizations are structured to compete in that industry. Shown below (Figure 5-2) is the graphical representation of the three generic strategies.

		Competitive Advantage	
		Low Cost	Differentiation
Competitive Scope	Broad Target	1. Cost Leadership	2. Differentiation
	Narrow Target	3A. Cost Focus	3B. Differentiation Focus

Figure 5-2 Three Generic Strategies (Porter 1980, pg. 39)

The effect of selecting a strategy highly impacts the organization structure and cost of competing. Being a *cost leader* is the result of a firm's ability to deliver the product or service for less than its competitor. This is normally associated with minimal innovation, as roll back cost for profit development is minimal. Since the single selection qualifier for public procurement is typically price, public sector contractors are usually *cost leaders* whom rely upon volume to sustain profit margins. Being a *differentiation leader* means the firm offers a unique product or service that cannot be found elsewhere. These firms can demand higher prices, and thus, higher returns on research and development investments. One example is the Beck Group's focus to move Destini (Destini 2001)⁴² to market. Should Beck succeed in making Destini a preferred tool, it has achieved a differentiation that no other firm can offer. Finally, being a *focus Leader* means that the firm targets specific markets and not a broad spectrum. As a second example, the George B. Macomber Company (Macomber) uses institutional channels for projects. By bidding on only universities, medical centers, corporate/industrial, and housing/hospitality, it hopes to provide its services to clients who are insensitive to price and highly sensitive to design quality and innovation. Focusing on these clients normally provides higher profit margins, than those who are over concerned with cost.

⁴² Destini integrates the architect and engineer functions into a single platform. Its application is in the construction of Real Estate initiatives and its goal is reduced cost and time from conception to design completion.

Failure to compete in one generic strategy or attempting to compete in all areas typically results in being “stuck in the middle” (Porter 1985, page 16) with no competitive strategy and lower profits.

5.3 Industry Competitive Advantage

5.3.1 The Construction Value Chain

The Value Change (Chain) is a term crafted by Porter in his second book, Competitive Advantage (Porter 1985). The Chain refers to the upstream and downstream competitors in a particular industry, as well as the horizontal and vertical portals⁴³ that lead to each. For purposes of this thesis, the Chain is synonymous with the construction value chain created by firms competing in the construction industry. Overall, the construction industry is a low technology innovator, as compared to the pharmaceutical or the textile industries. However, recent advances have created whole new dimensions and linkages in the Chain, as shown in Figure 5-3 below. Upstream firms are those that are at the front end of the production line. These include building products and materials producers, manufactures, and distributors. Down stream firms are the recipients of upstream products and services. These include the sponsor, owner, and the end user. High construction industry fragmentation allows many of these participants to enter at will. NAVFAC plays several roles, depending upon the segment of its services. NAVFAC utilizes a military construction force (SEABEES) that acts in the capacity of a general contractor and provides construction services to every DOD component. On the other hand, as the resource sponsor of Navy Military Construction, it programs, request funds, allocates funds, crafts the design and procurement, and maintains the life-cycle operations and maintenance of infrastructure. In this role it acts as the owner and sponsor combined. Finally, NAVFAC has an extensive architect and design staff, and also provides engineering support services to its clients.

⁴³ Horizontal and vertical portals are discussed in section 5.3.2.

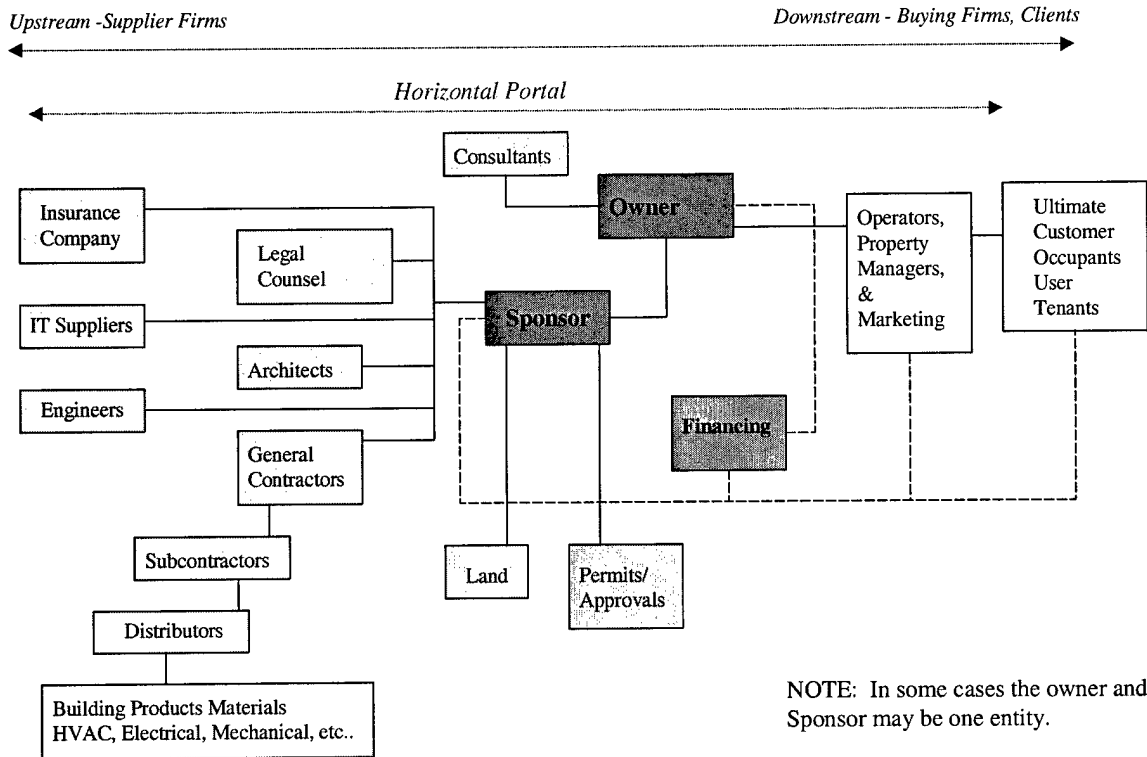


Figure 5-3 The Construction Value Chain

5.3.2 Horizontal and Vertical Portals

Portals refer to the crossing between units of the Chain. Items crossing can be products, services, information, personnel, or an infinite number of other possibilities. Horizontal portals refer to the portals that cross divisional boundaries (Porter 1985, pg. 318) that are on the same level. For example, business units within the Chain may share ideas through horizontal portals. Vertical portals are links between units that exist on different levels of the value chain. Intuit Incorporated (INTUIT) is a prime example of clever vertical portal execution. By providing a wide range of Quicken services, it channels clients at the front end and provides aggregated services for most all personal banking and finance needs. Both horizontal and vertical portals encourage competition by the creation of interrelationships, and it is these interrelationships that shape the Five Forces. Portals that exist, or are created through horizontal and vertical integration, are critical to this thesis. It is at these points that industry hopes to encourage savings and increase profits. As discussed later in his Chapter, this area is a potential point for NAVFAC to focus its procurement strategy.

5.3.3 Segmentation

Segmentation, when properly anticipated by NAVFAC, can increase its buyer power and open the aperture of existing portals. Industries must be segmented in order to be sustainable, as this yields an intrinsic attractiveness and competitive advantage (Porter 1985, pg. 234). Segmentation produces supplier and buyer differences that allow more competitors to enter a market. Four main areas that can be used to segment an industry are product variety, buyer type, channel (intermediate buyers or distributors), and geographical buyer location (Porter 1985).⁴⁴ Similarly, most industry firms are segmented internally as strategic business units. Its purpose is to be able to take advantage of internal and external interrelationships, which may be tangible, intangible, or a result of competitor interrelationships. Understanding the Five Forces in various market segments will help eliminate non-applicable ones and allow NAVFAC to apply limited procurement resources to the viable and appropriate markets.

5.3.4 Benefits of Competition

Competition is the primary aggregator in strong markets, in which there are four general categories: increased competitive advantage, improving current industry structure, aid market development, and deterring entry (Porter 1985, pg. 202).⁴⁵

- **Competitive Advantage:** Competitive advantage is necessary as competition can absorb market fluctuations; enhance a firm's ability to differentiate; allow some firms to serve unattractive sectors;⁴⁶ provide a cost umbrella for industry followers; improve bargaining positions with labor or regulators; lower antitrust risk; and increase industry motivation.
- **Improving Industry Structure:** Competition affects the structure by increasing demand, providing second and third tier sources, and reinforcing desirable elements of the structure

⁴⁴ Discussion in this section are based upon Porter's Interrelationships among Business Units, Competitive Strategy, pg. 317-363

⁴⁵ The list below is directly from Porter's book, Competitive Advantage. Its relevance to Market Drivers is expounded upon in Chapter 5.6.1 (Market Drivers).

⁴⁶ Public procurements are sometimes viewed as an unattractive sector to private contractors. Since final award selection is based upon lowest price, many innovative firms feel that this stifles competition and results in mediocre firms competing based upon profit created by volume of work.

- Aid Market Development: Competition allows firms to share the costs of market development, reduce a buyer's risk, promote an industry's image, and to standardize or legitimize technology.
- Deterring Entry: Though this is not a primary goal in NAVFAC procurement, competition can reduce new entrants by increasing the likelihood or intensity of retaliation, serve to block logical entry avenues, or crowd distribution channels. Market deterrence is relevant to NAVFAC procurements, as it must ensure that it does not promote competition that results in deterring new entrants.

While the Federal Acquisition Regulations require NAVFAC procurement teams to promote competition (FAR Part 6), this is not achieved by blindly offering solicitations to a wide number of contractors. Solicitations should be carefully crafted so that those bidders, whom are industry leaders, are attracted to the competition.

5.3.5 Technology Impacts

As mentioned previously, affects of technology have created new portals and linkages, as well as reduced the effort necessary in traversing existing portals. Technological advances in construction material, equipment, and information technology (IT), have created new segments in which to compete and intensified the rivalry within the industry. Advances in concrete mixtures by Granite have honed the accuracy of delivery times for clients and reduced the schedule float necessary for crews awaiting transit mixture arrivals (Granite 2001). By reduction in front-end costs, these savings can be passed onto the client, rolled back for research and development of newer technologies, or dispersed as dividends to shareholders. The advent of IT advances have undoubtedly had the greatest impact on the industry. The creation of the virtual value chain, as shown below in Figure 5-4, makes connecting all units of the Chain together possible. Construction industry innovators such as Collaborative Structures (Collaborative 2000), Primavera (Primavera 2001), and Destini (Destini 2000) all look to de-fragment the industry through improved communications and inefficiency reductions.

Technology allows all elements of the Chain to syndicate their information. The result is new market segments in which to compete and the creation of new business to business, business to customer, customer to business, and customer to customer relationships (Werbach 2000). The largest benefit is that information from any construction project can be used by an

infinite number of people, and the industry modularity is such that information can be broken into smaller pieces and applied where necessary. The virtual value chain create by IT reduces the friction at the entries and exits of the horizontal and vertical portals.

Technological development is one area were NAVFAC could potentially influence the industry. Bottom line profit motivation could be considered as the number one business motivator to strive for gained efficiencies and syndicating information. When this is combined with the transparency necessary for Government procurement reporting and control,⁴⁷ it seems logical that construction firms possessing internet based reporting or tracking systems would be the most attractive, from the standpoint of NAVAFC as a buyer. This author asserts that issuance of performance specifications structured to encourage innovative reporting and construction management efficiencies would attract “smarter,” contractors. NAVFAC would need to be cautious of not subsidizing one technology over another, but could indirectly aid the industry in developing knowledge syndication services.

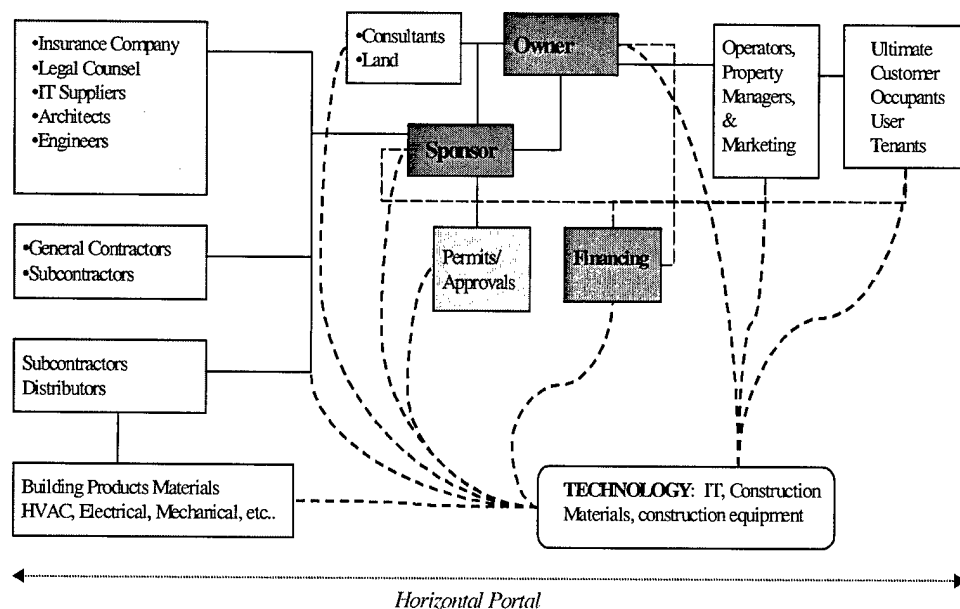


Figure 5-4 The Impact of Technology on the Value Chain

⁴⁷ The control necessary is transparency throughout the chain of command as to the status of various construction projects. This is often predicated by stovepipe funding channels for particular areas such as family housing, environmental, and military construction.

5.4 Competitive Advantage of Nations

5.4.1 Determinates of National Advantage

A nation's prosperity is governed by its willingness to organize around the issues that promote productivity. This includes a focus on policies, laws, and institutions to support them (Porter 1990, pg. xii). Porter advocates that firms, not governments, promote industry advantages, as they are the competitors. The dichotomy of influence is that while government can influence determinates by enabling competition, it cannot directly control its own National Advantage. It is the country's firms who determine a Nation's Competitive Advantage. There are three premises of Porter's Determinates (Porter 1990, pg. 69-70):

- Competitive advantage differs significantly between different industries and industry segments.
- Global competitors use value chains outside their home countries to produce some activities.
- Improvements, innovation, and upgrading can be use to obtain and sustain competitive advantage.

Just as the Five Forces can be used to view a firm's competitive advantage or profitability within an industry, Porter's "diamond" represents the forces that act on firms, which determine a nation's competitiveness. The "diamond" is dynamic and endlessly changing. Shown below, Figure 5-5, is the complete system and its Determinate links.

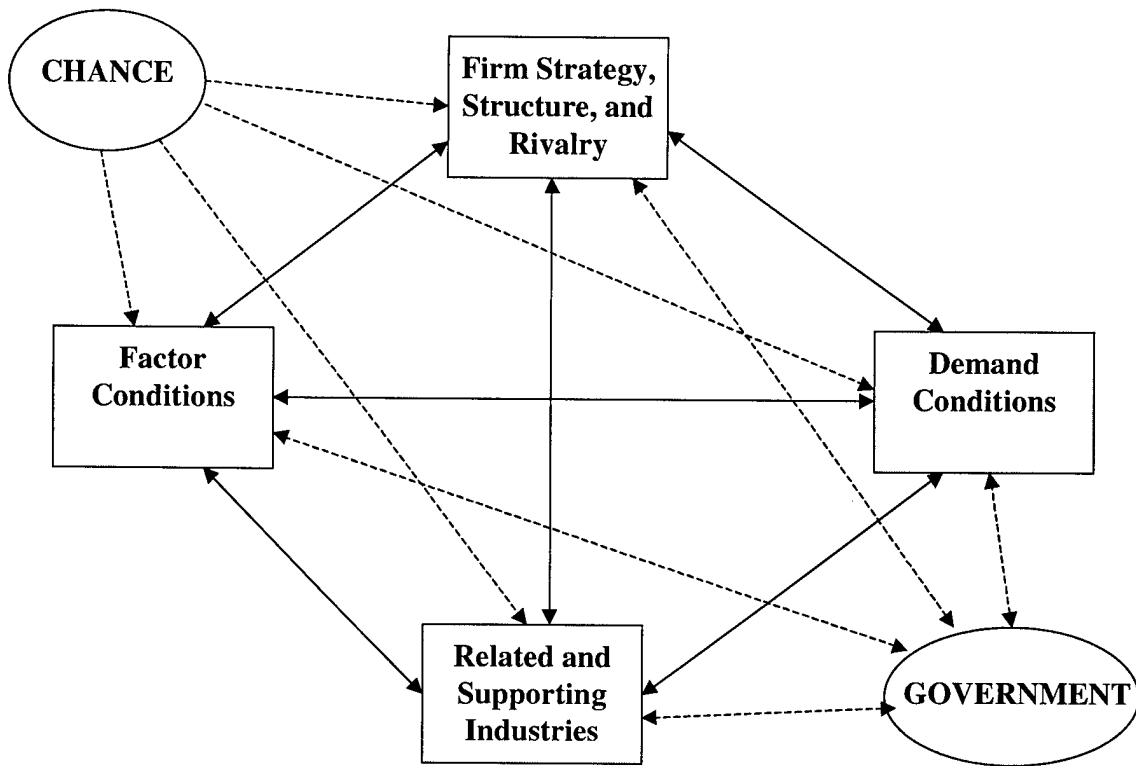


Figure 5-5 The Complete System (Porter 1990, pg. 127)

Factor Conditions

A nation possesses factors of production (Porter 1990, pg. 74), which it uses as industry resources to gain a competitive advantage. Possessing each is essential to production, though an over abundance is just as dis-advantageous due to the inability to coordinate and control them. A nation's factors of endowment are human resources, physical resources, knowledge resources, capital resources, and supporting infrastructure (Porter 1990, pg. 74-75). To possess each is not completely sufficient, as they must be carefully utilized in order for firms to leverage their nation's full competitive advantage. Within each, there are basic and advanced factors. Basic factors, such as natural resources and geographical location, were once effective in past history where high-speed transportation and communication were not available. In today's society, advanced factors, such as vastly evolved laws and infrastructure, far outweigh the basic ones. The advent of information technology solutions has served to override the effect of geographical separation. An advanced nation's ability to communication by voice and electronically usurps the divisions created by natural terrain and time difference. Government serves to regulate and promote the evolution of advance factors. Though highly structured by

regulations and laws, research technology produced from direct Government funding find an end-benefit in private industry.

Demand Conditions

Demand shifts the balance to or away from any one the determinate. The home demand significantly influences the “diamond” by affecting the size and pattern of growth, and the mechanism by which home demand is transferred to foreign markets. Domestic demand for infrastructure often provides the revenue stability for large US firms to apply their skills in foreign markets. Support through partnerships, joint ventures, alliances, and other syndication mechanism aids in the projection overseas. A prime example is the demand by NAVFAC for Navy base infrastructure in foreign countries, which meet U.S. standards for quality of life. This need is directly transferred to foreign markets by creating a demand for contractors who can provide this level of service. For example, the Navy has undertaken significant costs and risks to expand family housing in Northern Sardinia, Italy. By doing so, Italian firms have adjust their services to meet the solicitation requirements for the expansion project (EFAMED 2000). A tangible aspect is the requirement of 110-volts in each home. Intangible aspects are requirements that Italian contractors meet FAR and NAVFAC reporting guidelines and work-safety laws.

Related and Supporting Industries

The collateral success of an industry or segment can often increase the demand of tangential markets. These can be horizontal partners, such as raw textile providers to Li & Fung (Li & Fung 2000) stores, or vertical integration, such as Citibank’s (Citibank 1997) participation in the Chinese market. In each case, the action of the primary firm impacts numerous firms upstream and downstream in how they supply resources or received products.

Firm Strategy, Structure, and Rivalry

A Nation’s success is rooted in its ability to support management practices and processes that encourage its firms’ viability within markets that they hold competitive advantages in. Porter cites four influences of this determinate: company goals, goals of individuals, influence of national prestige/priority goals, and the importance of sustained commitment (Porter 1990, pg. 110-117).

The influence of national prestige/priority goals is were the public sector, specifically NAVFAC, can influences the competition of firms and attract construction industry leader

participation. The current political structure is to parcel off public procurements to as broad a range of industry as possible. For example, this is done through procurement regulation requiring that certain percentages of contracts be awarded to Minority, Women, and Small Business owners (FAR Subchapter D). Government has determined that supporting a broad range of business as one of its priorities. Though there is consideration given to awarding portfolios of contracts, such as a naval installation's facility service support and the Naples Improvement Initiative,⁴⁸ awarding to a broad construction market range provides competitive advantages to mid-range to small firms whom would otherwise be overrun by large contractors. NAVFAC possess the ability to encourage participation by the world's larger firms. By following the lead of such developers as in Hong Kong,⁴⁹ major projects can be bundled together with future operation and maintenance, to offer larger returns on investment for bidders. There are several options that NAVFAC can pursue. Of those discussed within the Infrastructure Systems Development Research group (ISDR 2000), the Navy's commitment to offer major portions of its utility services to industry providers would entice world renown construction firms, as it provides a steady revenue stream for many future years.

5.4.2 The Role of Chance

Porter identifies chance as occurrences that alter the conditions of the "diamond" (Porter 1990, pg. 125). Chance cannot be influenced by any of the four determinates or government, but can modify the competitive advantage of the firms and a nation. These happenstance occurrences include technological advances, shifts in financial markets, or actions of foreign governments that effect overseas markets. NAVFAC's role would be to minimize the risk of chance through its solicitations. If it desires to support innovation, it could craft performance-based procurements. Conversely, it reduces the occurrence of Chance by issuing exacting scopes of work and awarding solely based on lowest price. In other words, awarding by the lowest price reduces the Chance of innovation.

⁴⁸ The Naples Improvement Initiative is a \$438.5M Lease Construct program that includes 876 family housing units, 2 schools, medical facilities, and miscellaneous support facilities.

⁴⁹ Hong Kong leads the way in the Fundamentals of Public and Private procurement strategy. More can be read in Millers book, Principles of Public and Private Infrastructure Delivery (Miller2000).

5.4.3 Government Role

The role of Government is that it can influence and be influenced within the Porter “diamond” (Porter 1990, pg. 127), but it does not serve as one of the four determinates. Government policies and actions influence the course of firms but it is not a firm itself. In terms of the construction industry, Government should not only support the expansion of the small to medium contractors so that the larger ones do not monopolize the industry, it should also enable innovation through intelligently crafted procurements. Government can be used to reduce chance happenings that are detrimental to market competition. These include lowering interest rates to spur the economy, maintaining anti-trust laws to withstand the reverse integration of the nation’s smaller firms, and supporting resources that improve the nations Factor Conditions such as education, research and development.

The competitive advantage of firms serves to influence the nation by shaping the industries in which it chooses to compete. The dynamic intricacies of firms’ interactions, which contribute to a nation’s competitive advantage, are far to numerous to list in this thesis. However, the impact each has and its relation to each other are crucial. Public procurement officials must understand these to know how they affect the markets of the home nation.

5.5 Defining Market Leaders

The goal of any procurement is to attract market leader participation. Porter notes several characteristics of good competitor (Porter 1985, pg. 212-225).

- Each should be creditable and viable, by which they can submit good proposals and have the resources to perform the work.
- Each should have a clear, self-perception of its weaknesses. This enables them to correct deficiencies, and also not to participate in procurements that cannot be successfully complete.
- Good firms must understand the rules of engagement, both cultural and written.
- Realistic assumptions should be made by the firm of its location within its own segment and the industry overall.
- Knowledge of costs is necessary for a good competitor to submit accurate proposals and to understand self-administration and operating costs.

- Good competitors contribute to their own industry strategy and understand its own inherent strategic limitations. Without sufficient understanding of how to maintain positive influence over the industry, it is not possible to productively participate in the segmented construction market.
- A good competitor's segment involvement is negotiable; such that it can exit a market at-will should it feel that there is no longer profit. Competitors who cannot do so reduce the markets quality by anchoring-down progress made by its leaders.

The primary attribute of industry leaders is that it posses a sincere concern over the "health of the industry" (Porter 1985, pg. 216) in which it competes. It carefully reviews its actions before hand and how they benefit or hurt the competitive advantages of the firms within the construction value chain.

Also, market leaders are generally more abundant in countries which support trade and expansion. The globalized economy allows economist to review several indicators that point toward an emerging firm's opportunity for success within certain nations. World Trade Magazine recently listed the top countries for trade and expansion. A summary of the top five are shown below, and the countries in which the Navy has permanent waterfront installations.

2001 Rank	Country	Domestic Demand US\$BN	GDP US\$BN	Inflation	Unemployment Rate	Legal System
reference only	United States of America	107040.1	10373.6	2.3	4.3	Common
1	Netherlands	409.577	416.235	4.2	2.9	Civil
2	United Kingdom	1573.22	1535.13	2.4	5.4	Common
3	Canada	733.772	753.496	1.8	6.9	Common
4	German	2107.58	2156.38	1.5	9.6	Civil
5	France	1433.44	1463.16	1.5	9	Civil
5	Italy	1183.67	103.094	2.7	10.3	Civil
8	Japan	4213.21	4230.26	0.5	5	Civil
10	Spain	646.099	631.638	3.1	12.8	Civil
27	Greece	137.776	125.234	2.8	10.6	Common
not ranked	Puerto Rico**	unk	38.1	5.2	13.3	Common, base on Spanish Civil Code

** Statistics from World Bank Homepage. Puerto Rico data not ranked in World Trade. Data is from The World Fact Book 2000 (World Fact 2001).

Table 5-1 World Trade Listing of Top Countries for Trade and Expansion (World Trade 2001)

5.6 Industry Drivers

5.6.1 Market Drivers

By synthesizing industry motivators from Porter's trilogy, market drivers are crafted to aid NAVFAC procurement officials. By and large, the construction industry cannot sustain itself unless its participants obtain sufficient returns on investments to cover costs and profit, where each firm chooses its own return rate. Public sector procurement laws and regulations⁵⁰ place limitations on both, where incentives to private industry participation are incumbent on procurement officials letting attractive solicitations with gains based on other than just profit. The intent of the drivers below is to provide a framework to guide NAVFAC procurement officials.

- a. Availability of Appropriate Contractors (Gordon 1991): The sophistication of the contractors in the location of construction is crucial. Contractors lacking the available technical expertise or familiarity with the delivery process being used will negate the procurement official's flexibility to use those methods. This is a prime consideration at overseas locations where sophistication may be lower or plagued with local corporate galvanizing to set prices - collusion or corruption.
- b. Five Forces Impact (Porter 1980, 1985, 1990): Gordon proposed a review of the "current state of the market" (Gordon 1994). Reviewing the market from a strategic standpoint allows a critical view of the procurement's reception by private industry. Each local market has a somewhat predictable listing of contractors who may respond to NAVFAC request for qualifications or proposals. NAVFAC procurement officials must view the Five Forces to verify the bargaining power it possesses as a buyer. If in a weak position such as sole-source, the power is low and there is an inherent inability to negotiate the costs. On the other hand, NAVFAC can strengthen its position by crafted procurements that invite new entrants or promote a number of substitutes.
 - *Horizontal & Vertical Portals*: Procurement officials must review whether the delivery process supports existing industry portals or the innovation of a new

⁵⁰ Examples are the Federal Acquisition Regulations, NAVFAC Guidance Specifications, NAVFAC Performance Work Statements, etc.

portal. If it does neither, then the delivery process should be eliminated or the procurement modified.

- *Technology Leverages:* The sign of a good contractor is one that promotes and uses information technology in the solutions. If the information technology is not available, the procurement official needs to determine whether the risk is acceptable and allow an unproven technology, or only authorize the use of a proven systems. In the case of critical operations such as shore power or pierside fire protection systems, NAVFAC should not take on the completion risk. NAVFAC can allow innovation, but with proper redundancy should the initial system fail.
- *Procurement Impacts to the Value Chain:* Chapter 5.3 discussed the value chain and the interaction of its participants. With procurement officials educated on the value chain and its dynamics, NAVFAC may deem that the procurement is not attracting the industry segment that it desires. Also, there must be some understanding of NAVFAC's role in the procurement, whether it is as a SEABEE general contractor or as an owner/sponsor of Military Construction. Shown below is the umbrella effect of NAVFAC on the Chain.

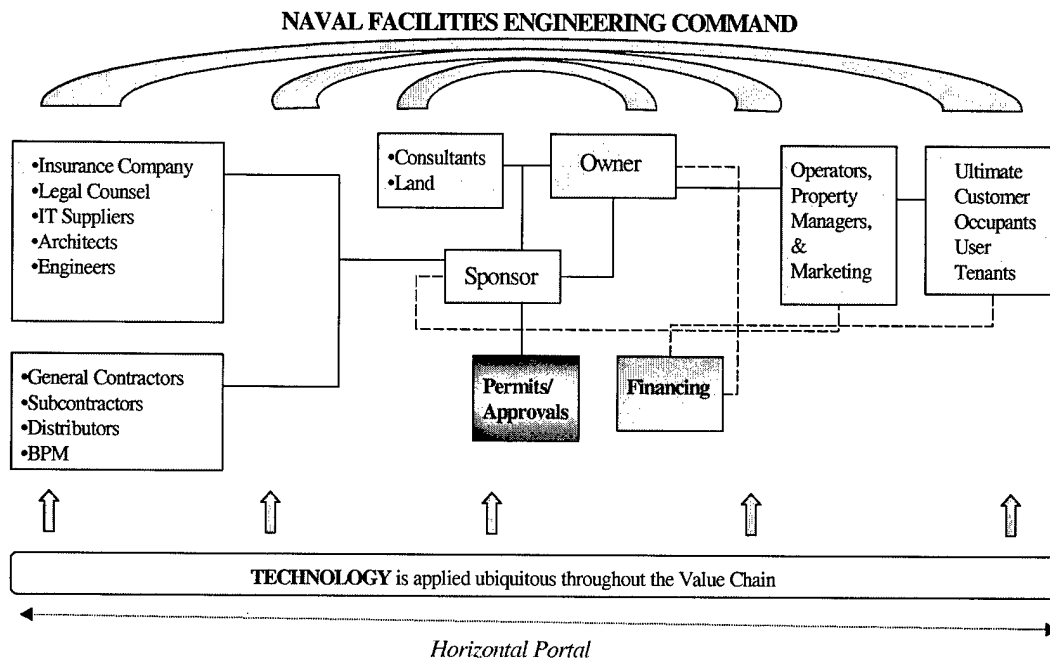


Figure 5-6 NAVFAC Effect on the Chain

- c. Package Size of the Project (Gordon 1991): By understanding the effect of the project package on the value chain, procurement officials can review whether the market can bear the project scope and size. If the package is too large, a competitive advantage from bidding firms could be better serve to unbundle the procurement. If it is too small there could be losses in economies of scale and artificially inflated bid prices to compensate for the losses.
- d. Current Capabilities (Gordon 1991): NAVFAC must review whether it has the staff capability to monitor the delivery method selected. If the capability does not exist, it must consider augmenting its staff or potentially eliminating the delivery method.
- e. Procurement Effects to Promote Leadership Competition: NAVFAC must be sensitive to the 4 determinates of Porters “diamond” (Porter 1990, pg. 127) that effects a nation’s competitive advantage. By letting contracts that take benefit from these, it can ensure greater competition and market bid prices. The failure to apply these determinates can result in lower quality construction, a lower demand to participate, or an un-leveraged home demand; where each of these artificially raise bid prices.
- f. Impact to the Role of Chance: A cursory view of chance should be considered. This may include the potential for the contractors to invent new technologies; for the economy of an overseas base location to strengthen or weaken; or for the possibility of military conflicts to affect procurements.

5.6.2 Desired Affect on Private Industry

Public procurement officials should view the overall process through the efforts of the competing industry. Through a waterfall decision process, shown in Figure 5-7, procurement officials can iterate the market drivers. For each iteration, NAVFAC procurement officials should review whether the procurement signals the correct strategy fundamentals, as discussed in Chapter 2.4, and whether the role of Government is advancing the desired industry segment.

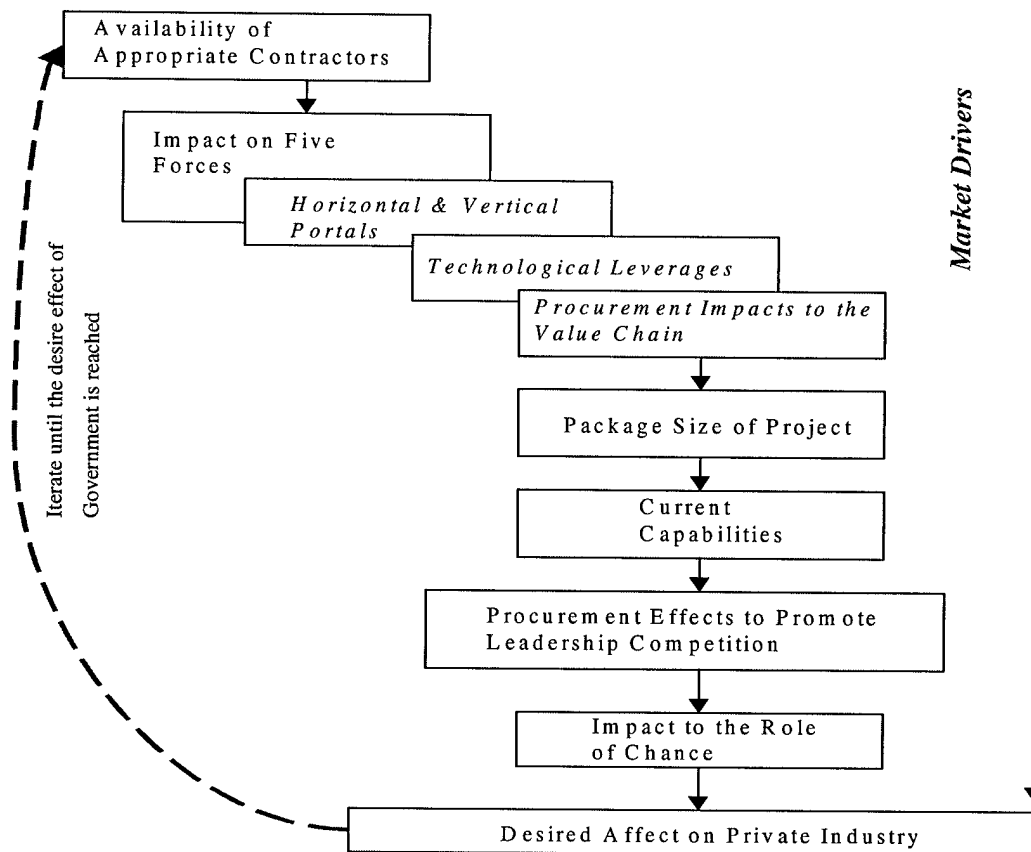


Figure 5-7 Integrated Market Drivers

5.7 Conclusion

The intent of this chapter is to provide a framework whereby NAVFAC can attract market leaders to participate in its procurements. This Chapter suggests that its mission should be to de-segment the fragments and craft procurement portfolios that encourage industry competitive strategies and advantages. It must be vigilant to not drive prices so low that only firms with significant exit barriers complete. Without industry leader participation, the loss is in real innovation and true cost savings. Chapter 6 combines these motivations with drivers discussed in this Chapter. Together they establish a *Three-Tiered Model* procurement process to attract construction industry leaders to participate in NAVFAC procurements.

6 *THREE-TIERED MODEL*

6.1 Introduction

This Chapter provides the framework for the *Three-Tiered* model,⁵¹ by which NAVFAC procurement officials can select a contracting delivery method to procure Navy Waterfront Facilities. It brings together the fundamentals discussed in Chapters 1 through 3 and synthesizes the drivers listed in Chapters 4 and 5. Several Applications later in this thesis apply this framework to specific installations. The spiral of drivers is continuously iterated until unacceptable delivery methods are eliminated. The spiral then feeds into the consideration of risk assessing and allocation, followed by a comparison between commodity and services. The culmination is a list of potential delivery methods for Navy Waterfront Facilities.

6.2 *Tier One: Fusion of Drivers*

The fusion of dynamic drivers is done by the creation of a reverse spiral, meaning the user moves towards the axis, vice outward as if the number of possibilities were expanding. The reverse spiral is a risk-orient model based upon the various drivers segregated into six sectors.

1. Navy Drivers: This sector considers facility requirements, force protection, master plan, construction sophistication, risk aversion modified, restriction of methods, socio economic considerations, and other drivers.
2. Project Drivers: This sector considers term of facility need, time constraints, political environment, flexibility needs, design process interaction, shared capabilities, preconstruction services needs, financial constraint, security, and manpower displacement.
3. Foreign Country Drivers: This sector considers the foreign politic impact, laws and restrictions, economic factors, and other country drivers.
4. Finance Drivers: This sector considers available financing, the EAUC, and regionalization.

⁵¹ The *Three-Tiered* model is very similar to the waterfall with risk reduction model. This type is commonly used in the development of software (McConnell 1996).

5. Market Drivers: This sector considers the availability of appropriate contractors, the Five Force impact, the package size of the project, current capabilities, and the procurement's effect in promoting industry leadership competition. Also the role of Change should be analyzed and finally, whether the Government is reaching its desired effect on private industry.
6. Commitment: In the final sector, the procurement official needs to commit to the elimination of certain delivery options or reenter the spiral for another iteration. Once a final commitment is made, the official can move on to the second *Tier*.

The Figure 6-2 in Chapter 6.4 depicts the spiral and its relationship to the *Tiers* Two and Three.

6.3 *Tier* Two: Risk Assessment and Allocation

6.3.1 Assess the Risk

Once the drivers are reviewed and improper delivery methods are eliminated, the procurement official will need to identify contract risk and determine their allocation. Assessing the risks of the construction project must be completed in advanced to properly anticipate their impact on the procurement. For example, waterfront infrastructure operations, maintenance, and construction are highly sensitive to forces of nature and safety considerations. The most predominate risk is the delay due to inclement weather and its impact on the construction delivery schedule. While most construction schedules contain float that is specifically used for delays such as this, locations with large thermal swings or heavy rainfall seasons will have a higher than normal completion risk. The Government may chose to bear the risk of inordinate weather delays, vice paying a high premium to contractors to bear it. Another consideration is the affect of safety programs and bonding. The Navy manages its own safety personnel program and is self-bonded. In order to reduce the amount of contractor overhead costs, it could chose to extend its program to cover contractor employees. This is normally referred to as an owner control insurance program (OCIP), and has produced noted cost savings in the construction contracts at the Massachusetts Port Authority and the Rose Center Construction in New York City.⁵²

⁵² 1.472 Innovative Project Delivery in the Public and Private Sector: The Rose Center Report, Spring 2001.

Items of risk that are normally not born by the Government are overseas environmental and extenuating safety issues. The Final Governing Standards (FGS 2000) provide the environmental guidance for DOD installations overseas. They are typically negotiated and agreed upon by the US Department of State and the host nation. Since these are continuously changing, NAVFAC has historically placed the burden of compliance on the host country contractor. They typically have the system expertise and the ability to foresee changes to the regulations that may be additional requires that must be maintained. Safety laws are similarly didactic and must be considered.⁵³

6.3.2 Allocating the Risk

Each driver can be considered a risk, in that it can either be significant, not applicable, or somewhere in between. The allocation should be based upon the impact to the project should the risk occur. In the above examples, the impact of a US overseas installation failing to follow local environmental regulations can lead to significant political problems. This risk is better borne by a local contractor who better understands the laws and who could potentially better arbitrate a solution if there is non-compliance. On the other hand, risks that have a low level of occurrence or minimally affect the construction project could be borne by the Government, resulting in lower costs.

One noteworthy success in risk allocation is the award of DOD's first-ever-indemnified environmental contract in FY2000. NAVFAC awarded the Fixed-Price Indemnified Environmental Clean Up contract in Charleston South Carolina. The award amount is roughly \$28-Million and the Government assumed the risk for extensive, unforeseen contaminates. Given the vast scope of work too clean up the inactive Charleston Navy Shipyard, this indemnification reduced costs over the traditional method of placing all the risk on the contractor.

⁵³ A prime example is the Italian 626/494 Safety Law. DOD components exert many resources keeping abreast and adhering to the Law's intent, which governs improvement of safety and the health of workers in the work environment (Tucci 1997).

The late Professor Henry L. Michel captured a listing of potential risks in his course taught at the Massachusetts Institute of Technology.⁵⁴ His listing of various risks are shown in the table below:

PROJECT RISK CATEGORY	RISK MANAGEMENT METHOD
<u>Completion</u>	
Contractor termination or default	Performance Bond
Force majeure	Specialty Bond
Concession Company default	Liquidated damages Clause
Project cancellation costs	Government/client pays
Land unavailability	Government/client pay
Labor shortage	Project Contingencies
Political upheaval	OPIC Insurance
<u>Cost Escalation</u>	
Changed scope	Project contingencies or claim
Schedule slip	Project contingencies or claim
Differing site conditions	Project contingencies or claim
Currency devaluation	Currency insurance, hedge funds or barter
Inflation rate increase	Project contingencies or claim
Wage escalation	Project contingencies
Material escalation	Project contingencies
Tax rate increase	Include in contract terms
High subcontractor/supplier bids	Project contingencies
Increased financing cost	Project contingencies or lock in cost
<u>Claims</u>	
Force majeure claim	Project insurance (Seismic, Flood Plain, or Hurricane/Tornado)
E & O loss	Errors/Omissions insurance
Delay claim	Liquidated Damages
Scope changes	Contract Provision
Differing site conditions	Contract Provision
Environmental damage	Insurance or cost to party causing damage
<u>Various</u>	
Terrorism	Insurance
Personal responsibility	D & O (Direct or Officer) Insurance

Table 6-1 Ways of Dealing with Various Project Risk Categories⁵⁵

6.4 Tier Three: Commodities verses Services

This section addresses the final issue of whether the procurement is a commodity or a service. Commodities are those that typically have minimal technical risks and can be performed by a wide range on contractors. Services refer to procurements that may have high degree of technicality, high visibility, or in the event of contractor non-performance, have a

⁵⁴ Professor Michel taught 1.463 "Globalization of the Engineering and Construction Industry" at the Massachusetts Institute of Technology.

detrimental effect on the Base Commander's mission. The graph, Figure 6-1, below summarizes the award method selection.

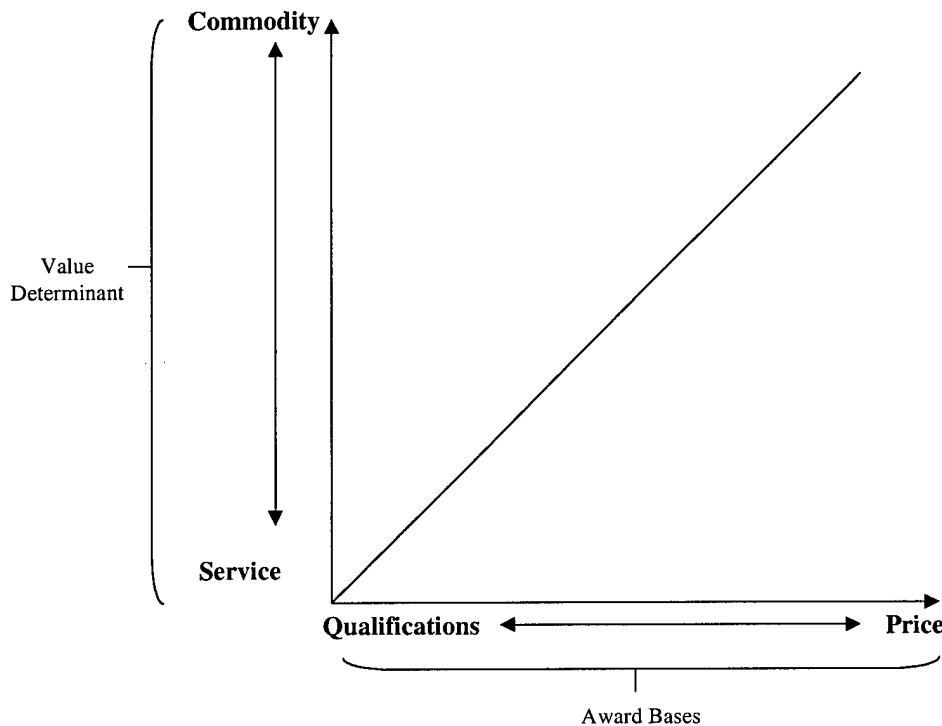


Figure 6-1 Commodity vs. Service Decision (Gordon 1.472)

The graph above suggests that procurements for commodity projects can be awarded based upon price, while those for services should be based on qualifications. This comparison is the final step in order for NAVFAC procurement officials to select an appropriate delivery method to attract contractors for Navy Waterfront infrastructure procurements.

⁵⁵ The list was discussed in Professor Michel's course.

6.5 Three-Tier Correlation

The *Three-Tiered* model below is the synthesis of factors present in this thesis. The most significant step is the procurement official's commitment to 'Eliminate a Delivery Method or to Reenter the Spiral' and start over.

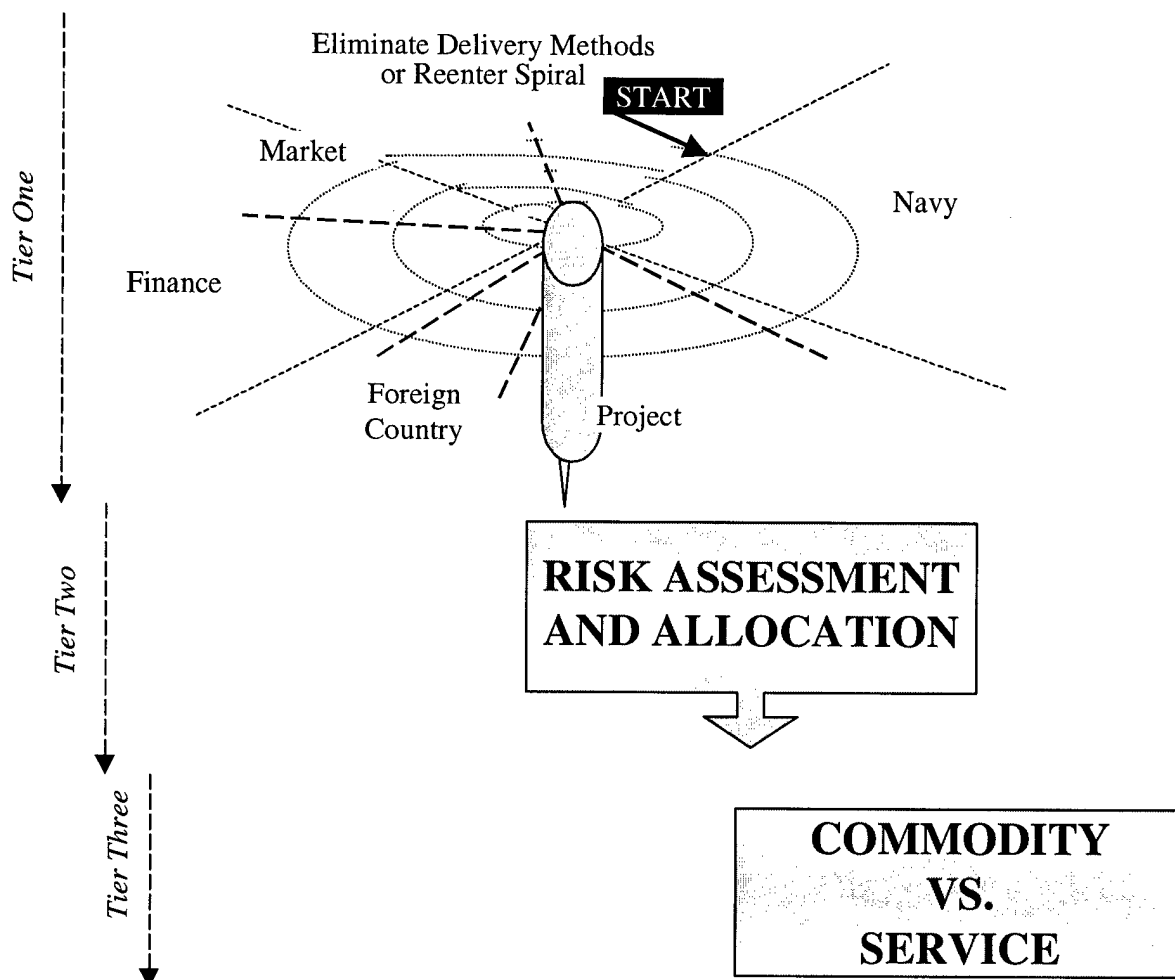


Figure 6-2 The *Three-Tiered* Model

6.6 Conclusion

The *Three-Tiered* Framework is a powerful tool to be implemented by public contracting officers for waterfront facility procurements. It includes consideration of the major drivers in the public procurement process; Navy and NAVFAC specific considerations; the effect on industry and ancillary markets; and laws and regulations that govern public procurements.

7 FRAMEWORK APPLIED

7.1 Overview of Representative Naval Bases

The *Three-Tiered* Framework is applied in this Chapter to the four-representative naval installations. Waterfront facilities were selected out of the portfolio of installation infrastructure, as they are the bellwether of naval facilities. As the direct connection between ashore-support systems and the fleet, there is a significant amount of information available. Unlike air control towers, runways, or maintenance facilities, no other DOD component can provide short-fused, substitute services should Navy waterfront facilities fail to meet the mission. The application of the framework is at the installation level and is used here as a precursor to define the requirements for the overall procurement and sustainment of the P&Ws at the selected Navy installations. The projects by which the framework is applied are MILCONs or the equivalent at overseas installations.⁵⁶

7.2 Scope of Facilities Considered

The scope of facilities reviewed in each case includes infrastructure of waterfront operational facilities, shipyard maintenance, production facilities, and other miscellaneous facilities located directly on the waterfront. The table below shows a listing of some of the facility types reviewed:

- | | |
|--|---|
| ❖ Piers and Wharves | ❖ Ship Navigational Buildings |
| ❖ Marine Cargo Staging Areas | ❖ Ship Operational Facilities |
| ❖ Shore Erosion Prevention | ❖ Fixed Crane Structures |
| ❖ Harbor and Coastal Buildings | ❖ Marine fuel dispensing |
| ❖ And other miscellaneous infrastructure located on the waterfront | ❖ Graving Docks and Drydocks |
| | ❖ Vehicle Maintenance, Waterfront Support |

7.3 Installation Public Works Support

Navy installations are support by two entities - Public Works Centers (PWCs) and Public Works Departments (PWDs). PWCs support major fleet concentration areas and 'sell' their services based upon client reimbursement. Each establishes rates based upon overhead,

⁵⁶ In Japan most projects are funded by the Government of Japan, vice by U.S. appropriations.

cost of service, and operations. The budgets for the nine PWCs⁵⁷ are combined annually and contribute to the Navy Working Capital Fund (NWCF), where this revolving budget must liquidate at fiscal year's end. In this Chapter, Naval Station Norfolk and Commander Fleet Activities Yokosuka are supported by PWCs. PWDs support smaller installations and operated based upon MC⁵⁸ direct funding. They are heavily burdened to defend their manpower and expenditures. PWD budgets are historically the first to be reduced during contingency operations, which requires a redistribution of the CNO budget. Naval Base Ventura County and Naval Station Roosevelt Roads Puerto Rico are both supported by PWDs.

As a result of regionalization, small bases in fleet concentration areas have consolidated their public works support into PWCs, such as a San Diego, Norfolk, and Jacksonville. Where once PWCs support only their own installation, smaller PWDs have been integrated into the local PWC in order to provide better services and take advantage of regional contracts. A few examples are as follows: PWD Miramar and PWD North Island into PWC San Diego; PWD Kings Bay Georgia and PWD Naval Air Station Jacksonville into PWC Jacksonville. PWCs must predict client requirements and anticipate future changes in base operating service levels. The advantage is that PWCs are less susceptible to CNO budgetary cuts, as a rate-charging operation, and can better define their capital investments for waterfront infrastructure.

As a matter of course, there is lack in continuity between the historical budget expenditures and the projection of future requirements. The inconsistency is not in the nomenclature of the tracking systems, but rather in the recording of expenditures within each category.⁵⁹ For example, FAC 1511 Pier And Wharf is a single element in FSM, but encompasses 11 different types of piers that were tracked separately under ICC Codes. This incongruity is discussed in Chapter 3, and is restated here as a caveat to the budget data gathered for the representative bases. Historical data is shown along side future requirements to emphasize this. The data is presented at the macroscopic level in order to show an order of magnitude comparison for future years. For consistency, finance driver data indicating trends and potential EUACs are based solely upon the FSM and future projections. This makes useful the historical and future data without respect to the incongruity.

⁵⁷ The nine PWCs are Washington DC, Norfolk Virginia, Jacksonville Florida, Pensacola Florida, Great Lakes Illinois, San Diego California, Pearl Harbor Hawaii, Guam, and Yokosuka Japan.

⁵⁸ Major Claimant

⁵⁹ Category to mean FAC and ICC codes.

Naval Station Norfolk (NAVSTA Norfolk) is selected as the first application due to its immense size and extensive waterfront responsibility. Located at the mid-center of the Atlantic region, it is the geographical center of Hampton Roads, and is 18-miles from the Atlantic Ocean bordered, by the Chesapeake Bay and Hampton Roads Harbor. Its mission is to support and improve the personnel and logistical readiness of the United States Atlantic Fleet,⁶⁰ and does so by managing over \$2.8-Billion in port facilities, quality of life, and personnel management services to the homeported and visiting fleets. Waterfront facilities management is provided by the Norfolk Public Works Center (PWC) under the Naval Working Capital Fund. An installation map is shown below.



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Amphibious Base Little Creek, Norfolk Naval Shipyard, Portsmouth Naval Hospital, Naval Air Station Oceana, and LRBC River Branch. The total plant value of all facilities is over \$5.2-Billion, with over 300 miles of roads, 80 miles of railroads, over 3 miles of waterfront, and over 42,000-acres of land.

NAVSTA Norfolk has the largest footprint of any naval installation. The oldest pier constructed was in 1942, while the newest was completed in FY2000. Pier widths range from 18-feet for the floating yard crane to 248-feet for the Amphibious Transport Ships. Most P&W are used year round with an average condition index of C2. Over 9000-short tons of ordinance⁶¹ and over 12,773,000-gallons of fuel are loaded via the P&Ws annually.

The application of the framework is against NASTA Norfolk's eight existing MILCON projects. These include primarily utility repairs, structural repairs/replacements, and complete P&W construction/demolition. The projects are listed in Table 7-1 below:

Pier Berth Name	Pending MILCON	Comments
21 berth 1,2,5,6	P-099, Replace Peir 21	Active Project Under Construction. \$40-Million
22 berth 1,2,5,6	P-099, Replace Peir 22	Demolish Pier 22. FY02. \$4.7-Million
3 berth 1,2,5,6	P-226 Renovation	Estimated FY2002. GE not public.
Lamberts Point	P302 Renovation	FY2003. GE not public.
2 berth 1,2,5,6	P-355, Replace Pier 2	Active Project Under Construction. \$44-Million
24 berth 1,2,5,6; South Wall; 23 berth 5,6; 4 berth 1,2,5,6; 23 berth 1,2,4	P-366, Upgrade Electrical Power	Deficiencies include inadequate utilities and structural strength to support current and future berthing requirements. FY2004. GE not public.
5 berth 1,2,5,6	R117-99 Renovation/Modernization	Locally funded by MC. Not MILCON
	R13-97 Renovation/Modeernization	Locally funded by MC. Not MILCON. Deficiencies include inadequate utilities and structural strength to support current and future berthing operations.

Table 7-1 Waterfront MILCONs at NAVSTA Norfolk Virginia

⁶⁰ The breath of responsibility of the U.S. Navy Atlantic Fleet was discussed in Chapter 2.

⁶¹ One short-ton is equivalent to 2000-lbs.

7.4.1 Tier One: Navy, Project, Foreign Country, Finance, Market Drivers

7.4.1.1 Navy Drivers

- a. Requirement: The location of NAVSTA Norfolk is ideal terms of geographic location, weather, strategic proximity, and accessibility. The requirement to sustain the functionality of the P&Ws is necessary proportionate to the size of the fleet berthed. 50 of the existing P&Ws were constructed prior to 1950 and have reached their serviceable life span (Johnson 2001). Pier replacements are necessary to maintain the primary mission of the installation. Each of the eight MILCON projects is part of the NAVSTA's 25-year revitalization program.
- b. Force Protection: Over the past three decades the Naval Station has varied its force protection posture. The gates to the NAVSTA were recently opened and full access is granted.⁶² However, they could be closed depending upon the condition of threat and the P&W areas are still maintained as separate security complexes. For purposes of P&W construction work, the areas are considered sensitive and limited access is granted to active piers.
- c. Master Plan: Each pier on the NAVSTA has a designated purpose and is configured to host a specific type of vessel. The eight active MILCONs for the replacement and upgrades involve 37 piers. Through discussion with PWC Planners, each project was first reviewed to ensure the project met the intent of the installation Master Plan and fleet modernization.
- d. Construction Sophistication: Due to operational mission and ship berthing requirements, NAVFAC has limited procurement to DBB only,⁶³ and NAVFAC possess the sophistication to monitor the construction under DBB. The option of utilizing a CM or BOT delivery method is not used by the installation. Additionally, the piers are of similar design and DB would not be applicable more than once.
- e. Risk Aversion Modified: The installation CO, PWC, and NAVFAC are extraordinarily risk adverse to P&W projects that may affect ability to deliver services. There is no hierarchical order to weigh the P&W, however, those supporting CVNs, DDGs, SSNs,

⁶² The two reason were to improve the traffic flow along through the Hampton Roads community, as NAVSTA offers a significant shorter route for north-south travelers, and also to demonstrate to the taxpayers the use of public funds.

and LPDs are historically the most critical to fleet readiness. Each of these MILCONs supports the critical ships listed above.

- f. Restriction of Methods: No restriction exists other than those delivery methods not currently allowed by NAVFAC or the FAR. There are currently no waterfront design build efforts ongoing at NAVSTA Norfolk.
- g. Socio Economic Consideration: Contracts are being considered which include base operating and support functions, however these are not MILCON procurements as BOTs. These could potentially displace general schedule employees, whom would be entitled to participate in the human resources priority placement program. NAVFAC has set-aside station funded janitorial and maintenance contracts as potential socio economic programs. Due to the size of each project, there were no opportunities to apply socio economic programming to the MILCONs.
- h. Other Drivers: Environmental and regulatory restrictions are some other applicable limitations. At this time however, there are none that may necessitate the elimination of any single delivery method.

7.4.1.2 Project Drivers

- a. Term of Facility Need: Construction of waterfront facilities is for long term usage. The amount of time and funds invested is seeded for operational payback through the future year defense plans (FYDP).
- b. Time Constraints: All six MILCONs affect four or more piers, and the direct ability to provide support to DDGs, SSN, and LPDs. Because of this, and the active projects are considered to have significant time constraints. Though ships and submarines can be nested, by which a vessel can be place outboard of a pierside berthed ship, this is not preferred as there are many intrinsic difficulties in cross-decking power lines, communication cables, and providing CHT⁶⁴ services. However, due to the operational mission of the NAVSTA, only DBB is applied, as some other methods do not allow full station control.
- c. Political Environment: The Navy will need to maintain control of the contractor in the areas of waterfront operations, both in terms of security and for safety reasons.

⁶³ Interview with Mr. Dennis Phelps, Director of Contracting for the Naval Facilities Engineering Command, Atlantic Division.

⁶⁴ CHT refers to holding and transfer tanks related to waste and wastewater disposal.

- d. Flexibility Needs: The Navy maintains its flexibility by awarding contracts that include more than one facility and that can be adjusted to meet its own needs. Operational buildings and piers that deliver direct services to ships must meet certain performance criteria during construction, so that support is maintained. In this case, the Navy needs flexibility in the process due to the range of service offered by each.
- e. Design Process Interaction: In general, NAVSTA Norfolk prefers to maintain control of the performance specifications, specifically as to the requirements of power, CHT, water, and communication connections. The Navy chooses to procure each of these MILCONs via DBB, as they required significant input into the design process.
- f. Shared Capabilities: At this time, NAVSTA Norfolk is not considering BOT projects as an alternative delivery method.⁶⁵ Several base operating service support (BOSS) contracts exist; however, these are separately awarded from construction contracts and with concessions not exceeding 4-6 years.
- g. Preconstruction Services Needs: Since the waterfront facilities are located in an accessible region within CONUS, this service is generally not needed. Supporting documentation and site visits are required under boilerplate contract specifications.
- h. Financial Constraints: The six MILCON projects were approved through the Congressionally budget process, and two projects were locally funded. Both project types are extremely risk adverse to costs. General waterfront maintenance is achieved through BOSS contracts.
- i. Security: All of the existing NAVSTA Norfolk waterfront MILCON projects are sensitive to national security objectives. However, this does not affect the delivery method other than what is already presented.
- j. Manpower Displacement: No existing MILCON contracts result in the direct reduction of employees.
- k. Summary: The chart below displays the drivers versus delivery options available. Although NAVSTA procures waterfront facilities by DBB, DB-R and T-R were not eliminated as they are viable means to obtain the work if operational mission were not impacted. Based upon the parameters listed on Table 7-2 below, the available delivery methods are GC-FP, GC-R, MP, DB-R, and T-R. CM and BOT were eliminated due to

⁶⁵ Verified as a NAVSTA and NAVFAC policy.

NAVFAC sophistication and the uncertainty of eliminating in-house operations, respectively. DB-FP and T-FP were eliminated due to the complete lack of Navy control over the design process.

	GC-FP	GC-R	CM	MP	DB-FP	DB-R	T-FP	T-R	BOT
Long-Term Facility Need	X	X		X		X		X	
Short-Term Facility Need									
Fastrack Schedule (Gordon 1991)		X		X		X		X	
Sequential Schedule (Gordon 1991)									
CONUS - Political	X	X		X		X		X	
OCNUS - Political									
More Flexibility (Gordon 1991)		X		X		X		X	
Less Flexibility (Gordon 1991)									
Design Interaction (Gordon 1991)	X	X		X		X		X	
Less Design Interaction (Gordon 1991)									
Shared Capability									
Non-Shared Capability	X	X		X		X		X	
Pre-Construction Advice Needed (Gordon 1991)									
No Pre-const Advice Needed (Gordon 1991)	X	X		X		X		X	
Financial Constraints	X	X		X		X		X	
Security Constraints									
Manpower Constraints									

Table 7-2 Consequence of Drivers on Delivery Method Options

7.4.1.3 Foreign Country Drivers

These drivers are not applicable as NAVSTA Norfolk is located within CONUS, and political, foreign laws and restrictions, and economic factors are not present.

7.4.1.4 Finance Drivers

- a. Available Financing: Available financing is limited. Installation facility managers must operate under limited budgets to maintain waterfront serviceability, or package and seek projects under MILCON authority. The eight representative projects have appropriated financing approved by Congress or the local installation.

- b. Equivalent Uniform Annual Cost (EUAC): Historical ICC waterfront expenditures and future FAC predictions were captured for NAVSTA Norfolk waterfront facilities. ICCs 03, 04, and 07⁶⁶ are shown in the figure below. FSM projections are shown congruently with the ICCs in Chart 1 below.

Historical ICC data was obtained from a combination of NAVSTA Norfolk comptroller personnel and through CINCLANTFLT,⁶⁷ the MC for the Atlantic region. The spike in FY1999 was due to the increased mission tempo of Kosovo. This anomaly is representative of the budget redistribution away from smaller PWDs, and to the allocation of facilities in direct support of contingencies.

From the graph below, it can be seen that future budgetary trends do not indicate a short-term replacement requirement (i.e. within the next seven fiscal years). The primary indicator is that NAVSTA Norfolk's transition to the FSM method of facilities management may not adequately predict an EUAC, whereby making it difficult to predict the time of replacement of the *defender* waterfront facility. The application of EUAC or Net Present Value is a proven methodology, which NAVFAC should consider incorporating.

⁶⁶ ICs were presented in Chapter 3. ICC 03:Waterfront Operational Facilities; ICC 04:Other Operational Facilities; ICC 07:Shipyard Maintenance and Production Facilities

⁶⁷ Commander in Chief, Atlantic Fleet Facilities Staff located in Norfolk Virginia.

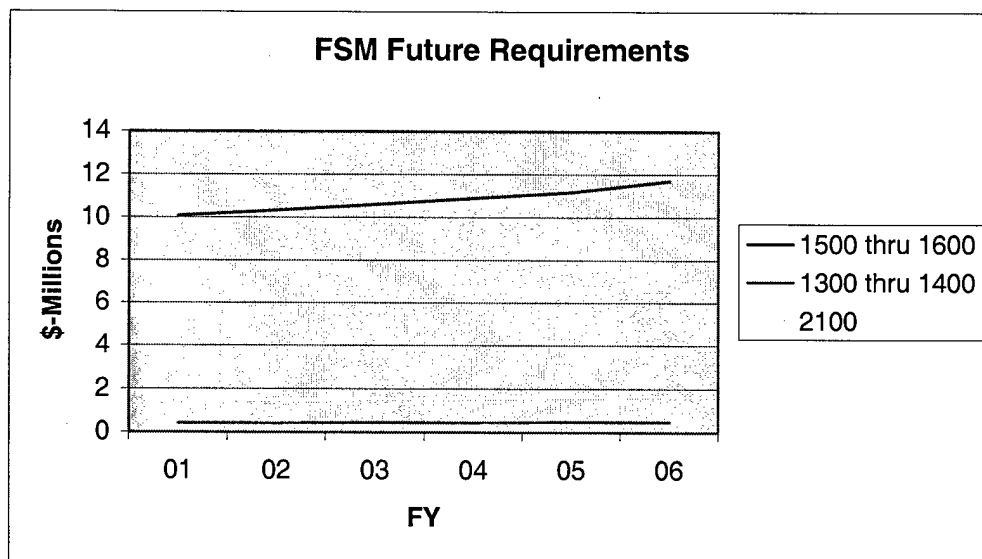
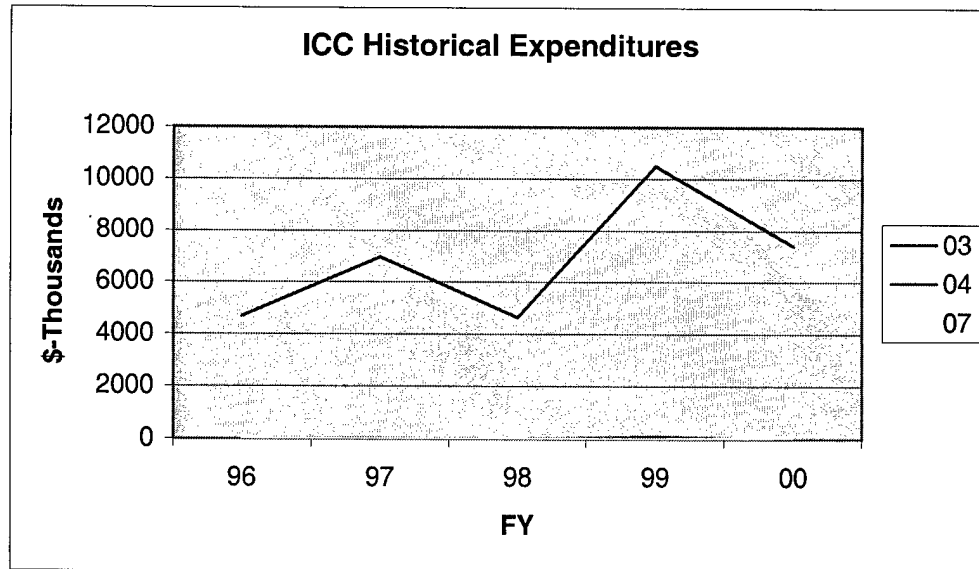


Chart 1 Historical ICC Expenditures and Future FAC Requirements

- c. Regionalization: Each MILCON was review for its impact on the greater Hampton Roads area. The positive impact of regionalization is the ability to look across all eight bases in the Hampton Roads area and resource level funding and waterfront requirements. The 25-year revitalization plan is a direct result of this capability.

7.4.1.5 Market Drivers

- a. Availability of Appropriate Contractors: There is an abundance of available contractors with waterfront construction experience, and a near predictable list of contractors who

submit bids for each solicitation.⁶⁸ Additionally, stateside contractors possess a high sophistication for the technical aspects of the work.

- b. Five Forces Impact: The application of DBB methodology to the eight projects is effective. However, utilizing a delivery process, which takes advantage of waterfront technology and BOT methods, may have been more advantageous, but increase the operational risk of the pier. The cost up front would have been lower, and the guaranteed revenue stream for a 50-year concession period would have attracted industry leaders.
- c. Package Size of Product: The project sizes were appropriate. Renovation work for several piers was bundled, as well as the replacement/modernization of several others. This enabled large contractors, with the specific skill sets, to bid on the projects and take advantage of economies of scale. The sheer size of the projects is an attraction alone to major construction firms.
- d. Current Capabilities: NAVFAC determined that it did not possess the current capabilities to monitor the projects, as it lacked manpower. Through a Title II action, an augment QA staff was requested with existing project funds for the MILCON projects.
- e. Procurement Effects to Promote Leadership Competition: In this author's opinion, the U.S. construction industry, both public and private, under utilizes its Factor Conditions (Porter 1990).⁶⁹ Through a DBB procurement process, public agencies rarely see the savings Related to Supporting Industries, such as BPM. Leadership involvement is sometimes spurred by change. Though LANTDIV is leaning forward in its procurement strategy, it is this author's opinion that deck-plate employees must be weary of not becoming complacent with existing contractors, and they should leveraging opportunities to innovate.
- f. Impact to the Role of Chance: The major advantage of NAVSTA Norfolk applying the DBB method is that it reduces⁷⁰ the opportunity of Chance having a negative affect in

⁶⁸ Interview with Mr. Dennis Phelps, Director of Engineering for the Naval Facilities Engineering Command, Atlantic Division.

⁶⁹ The terms used in this section are from Porter 1990.

⁷⁰ To reduce the opportunity of Chance is not to control it. Reduction only controls the areas by which Chance can occur, however none of the determinates can influence Chance opportunities.

the procurement cycle, from the Navy's standpoint. It requires the Navy to react to Chance occurrences through contract modifications.

- g. Summary: Based upon the existing market drivers, there are no further delivery methods to be eliminated.

7.4.1.6 Commitment

NAVSTA Norfolk is applying the DBB methodology successfully.⁷¹ Based upon *Tier One*, the following delivery methods should be eliminated and a commitment made to move into *Tier Two*:

Eliminate: CM, BOT, DB-F, T-FP

Retain: GC-FP, GC-R, MP, DB-R, T-R

7.4.2 *Tier Two*: Risk Assessment and Allocation

7.4.2.1 Assess the Risk

The predominate risks are weather impacts, the potential for global conflict, and upcoming modifications to war-fighting platforms based upon new research and development efforts. Each will impact construction. In the case of weather, there are appropriate days allowed for delay incorporated into the contract. The impact of a global conflict could delay/eliminate access to the job site, increase demand on the existing waterfront infrastructure due to higher loading, or even result in the termination of the contract for a myriad of reasons. Finally, the advent of new technologies and hull designs affect pier-side connections. These three risks have the potential to stop construction, but can all be handled within the framework of the Changes Clause (FAR 43).

7.4.2.2 Allocate the Risk

The three risk discussed above should be allocated to the Navy, though some of the weather should be proportioned to the contractor, but not all. In each case, their occurrence is unpredictable and the impact to project cost is tremendous. By the Navy assuming the risks of each, contractors enjoy a fiduciary relationship where there is some loyalty to the contractor from the Navy for these unavoidable risks. The benefit is that the cost of insuring against these risks are not included in the contract award price and the ability for more contractors to compete due to the lower bonding requirements.

7.4.3 Tier Three: Commodity verse Service

Waterfront procurement in the magnitude of MILCON projects is a service. Although awarded by DBB based upon lowest price, the Navy's goal should be to award to the best-qualified contractor. While price is a consideration, the emphasis is to maintain mission readiness, and therefore selecting the best-qualified contractor should be of the utmost importance.

7.4.4 Naval Station Norfolk Conclusion

The *Three-Tiered* framework revealed two considerations for future procurements.

First, previous research suggests that the use of non-traditional delivery methods could have produced the project at a shorter schedule (Miller 2000, page 59). However, strategic drivers and operational requirements relegated the PWC to apply the DBB to its waterfront facility procurements. Previous research suggests that an integrated contracting approach, such as those in Quadrants I or II, may be more effective.

Second, based upon current accounting practices, there is no ability to correlate historical expenditures with future requirements at this time. Though, the FSM is in development and this could be done in the future. Previous projects, which considered operations and concessionaire periods,⁷² required that the owner be able to understand his historical expenditure and future requirements. The Navy will need to adjust its current accounting practices for waterfront facilities in order to take advantage of BOT delivery methods.

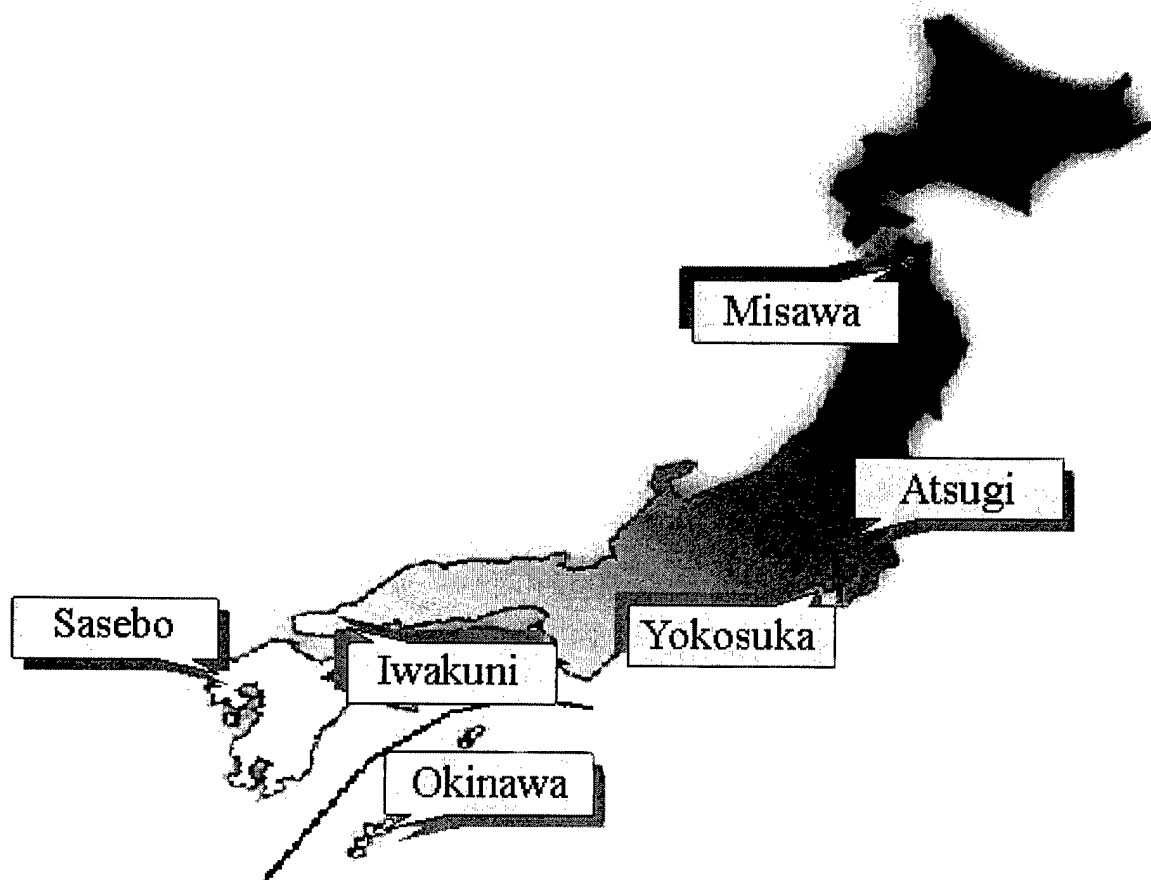
⁷¹ NAVFAC success is based upon delivering on time, on budget, and with high quality. Though these MILCONs and projects are ongoing, they brief well as to the three NAVFAC indicators.

⁷² Several case studies from 1.44 Public Infrastructure Development Systems.

7.5 Commander Fleet Activities Yokosuka Japan

Commander Fleet Activities Yokosuka Japan (CFAY) is one of the Navy's most unique naval stations, both in strategic terms and in facility management. CFAY is located at the entrance of Tokyo Bay, approximately 50 miles south of the City of Tokyo, and encompasses just under 600-acres in the Kanto Plains region of Central Honshu, Japan. The base supports 55 commands and is the one of the largest and most strategically important naval installations. The operational base mission supports the United States Seventh Fleet and the Commander of Destroyer Squadron 15, which includes the homeport aircraft carrier USS Kitty Hawk (CV 63) and its 17 ship battle group. Facility maintenance is provided by the PWC.

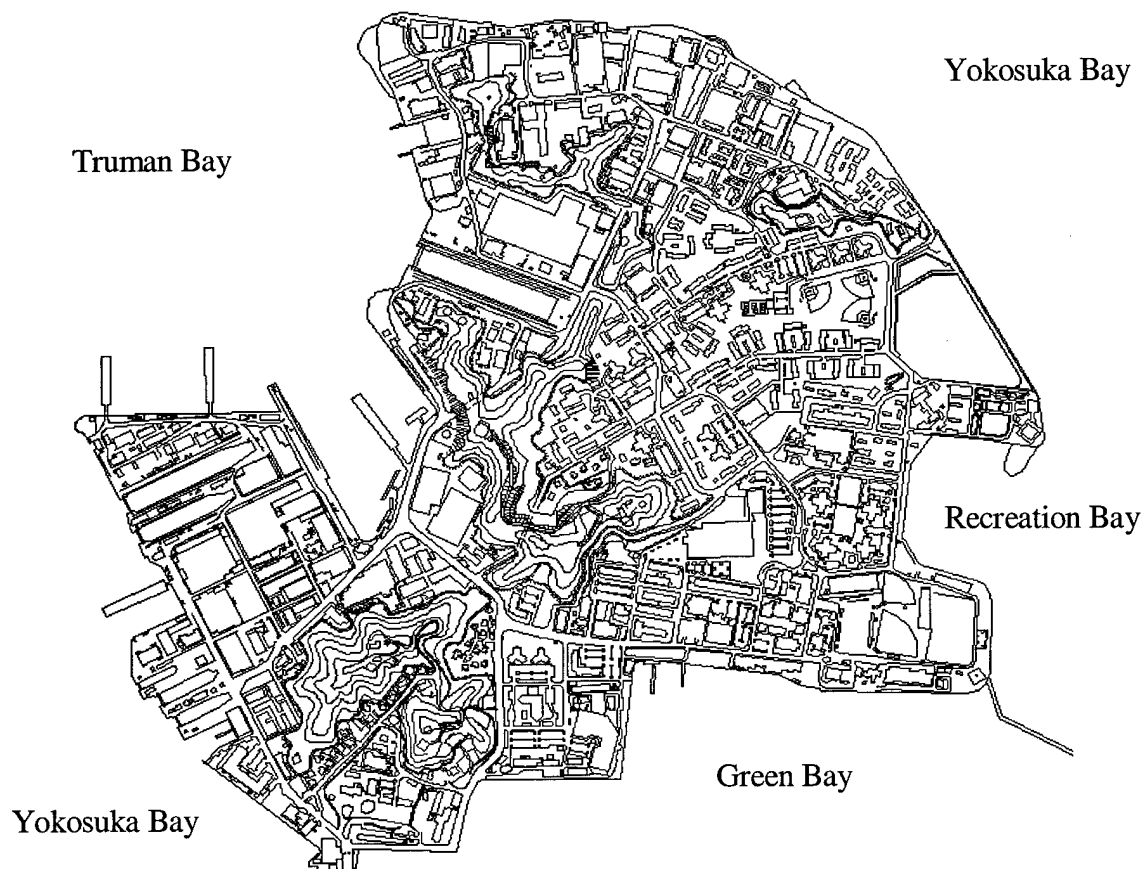
NAVFAC maintains several offices on naval installations throughout Japan, as shown on Map2 below.



Map 2 Location of NAVFAC Offices in Japan and Korea

CFAY is unique in that it is the lead naval installation to incorporate Arcview with the Navy Capital Improvement Planning process (Dunham 2001). In 1998, PWC Yokosuka became the lead agency to provide GIS services to U.S. Military Commands Japan-wide, except Okinawa. At this time CFAY is working to import global positional photos of the installation into the GIS system. CFAY is in a distinctive position and within close-response distance to many Asia crisis locations. As such, infrastructure readiness to support the fleet is the base's highest priority.

CFAY boast significant amounts of tasking yearly in fleet support. The infrastructure consists of 31 piers, which supports 101,211,000-gallons of annual fueling, 983-pierside phone connections, and 28 T-1 connections. Pier widths range from 26-feet for the yard crane to 164-feet for the drydock in the ship repair facility. The newest pier was commissioned in 1999, while the oldest in 1921. The waterfront operations alone sum up to over 415,000-Squarefeet with a plant value of about \$400-Million dollars.⁷³



Map 3 Plan of Commander Fleet Activities Yokosuka, Japan

⁷³ Interview with LCDR K. Ogawa, Regional Public Works Officer for Yokosuka Japan

U.S. DOD installations in Japan, in general, receive minimal to no MILCON. The Japanese Facilities Improvement Plan (JFIP) is an established program by which GOJ funds most new construction. The Japanese Defense Policy defines the reasons for support.⁷⁴ The Navy establishes a need based upon international Treaty and the installation Master Plan. These projects are presented to GOJ for approval, whereby the Government of Japan (GOJ) funded over 70% of total U.S. military support as host nation support. This totaled \$5-Million in 1998 alone (FAS 2001).

The application of the framework is against the six existing JFIP projects⁷⁵ at CFAY. The focus of these projects is to increase waterfront capabilities to meet existing ship loading requirements. In the case of Berth 2 and 3 listed below, the Military Handbook 1025/1 for Piers and Wharves (MILHDBK 1990) states that the length of a pier should equal the overall length of the largest ship to be accommodated, plus an allowance of 50 feet. Berth 12 is the aircraft carrier and berth 10/11 are the nuclear submarine berths. As an example of the age of the P&Ws, Berth 2 and 3 were constructed in 1945. The projects are listed in Table 7-3 below:

Pier Berth Name	Pending MILCON	Comments
BERTH 10,11	NA 327, Replace Berth 10/11. \$25-Million	Too close to CVA Berth , seperation distance 327 FT reqd.
BERTH 12	NA 343, Berth 12 Improvements - Inadequate length for the Aircraft Carrier. Underconstruction 1999 - 2004. \$100-Million.	
BERTH 2, 3	NA341, Pier Replacement (Berths 2/3). \$20-Million.	Inadequate length for DDG. The existing berth is 495 feet long - DDG lengths varyfrom 437 feet to 568 feet.
BERTH 5	NA352, Upgrade Berth 5. Planned upgrade to meet DDG 51 type ship rquirements. \$40-Million	Japanes Maritime Self-Defense Force (JMSDF) to berth diesel submarines.

Table 7-3 Waterfront MILCONs at Combined Fleet Activities Yokosuka

⁷⁴ Discussed in Chapter 7.5.1.1.a.

⁷⁵ For purposes of this thesis, the term JFIP is the project type, vice MILCON, as GOJ funds.

7.5.1 Tier One: Navy, Project, Foreign Country, Finance, Market Drivers

7.5.1.1 Navy Drivers

- a. Requirement: The requirement to maintain waterfront facilities in Yokosuka Japan is mission readiness, and stems from the World War II peace treaty, where the Japanese Defense Policy included “not becoming a military power” (JBPND 2000). This was done to prevent the reemergence of military superiority that could potentially lead to future conflicts. Under the auspices of the Treaty Of Mutual Cooperation And Security Between Japan And The United States Of America - Article VI (TMCS 1960), the JMSDF conducts cooperative operations in the event of an emergency. The presence of the homeported fleet is to support this Treaty.
- b. Force Protection: CFAY is the Navy’s lead installation to implement the new Anti-Terrorist Force Protection Standards (ATFP).⁷⁶ As such, all new construction must meet the evolving criteria established by DOD and tailored by the chain of command to the installation. The event of the Khobar Towers bombing and the U.S. Embassy bombing have reinforced the need to be watchful, especially near overseas facilities directly related to the operational mission such as waterfront infrastructure.
- c. Master Plan: The JFIP planning process requires that the U.S. Navy show its entire footprint for each installation and its relevance to supporting the TMCS. This driver is included in the existing decision process of facility procurements. The procurement specifications require that contractors provide As-Built electronically, so that they can be incorporated into Arcview.
- d. Construction Sophistication: GOJ acts as the prime contractor on all JFIP projects. The delivery methodology is via MP and the Army Corps of Engineers has the lead as the liaison between the U.S. components and the GOJ. The regional PWO acts as the representative for CFAY.

In the event of a MILCON or other station-funded contracts, NAVFAC has the expertise in-house to execute and inspect waterfront facilities. As discussed below under Restriction of Methods, DBB is the only method used.

⁷⁶ ATFP includes individual readiness, such as personal biological weapons protection, and also facilities hardening against bomb blast and other insurgent activities.

- e. Risk Aversion Modified: Due to the forward-deployed location, the installation CO is highly risk adverse. The impact of JFIP project schedule changes can affect the mooring ability of the USS Kitty Hawk or other ships. The mutual cooperation between the United States and Japan sometimes allows for new waterfront facility construction, prior to the abolition of the existing. This opportunity is not always shared in CONUS.
- f. Restriction of Methods: Due to the unique location and dispersion of contracting authority responsibility amongst the service components, NAVFAC has elected to only execute construction and facility support contracts as fixed-price or indefinite-quantity contracts. These are awarded via sealed bidding, negotiations, or quotations. Procurement innovation is limited by the ability to coordinate with the other services and not usurp existing agreements and memorandums of understanding on which service controls which procurement. JFIP projects are awarded solely as DBB, where all of the completion risk is placed on the contractor. GOJ does not deviate from this method.
- g. Socio Economic Consideration: These programs are not applicable here. Also, contractors are not required to adhere to the Buy American Act (BAA).
- h. Other Drivers: The potential for political impacts at an overseas installation of this size is ostensible. Any project that may give the ability of CFAY to house nuclear vessels is closely scrutinized, and stands the chance of being disapproved for JFIP funding. All of the surface ships are 'oil-burners,' so the political ramification of a nuclear presence is not applicable at this time.

7.5.1.2 Project Drivers

- a. Term of Facility Need: The TMCS is effective indefinitely, or until either of the parties chose to terminate.
- b. Time Constraints: Each JFIP is to modernize the piers to meet ship size requirements. DD/DDGs are moored in these locations at this time under CNO waivers, which expire once the projects are completed. Per discussion with the installation managers, the JFIPS cannot effect the operational mission of the ships. Yokosuka Bay, as seen on Map 3, is the only waterfront area that is capable of hosting an aircraft carrier and one that has pier certification for nuclear ships. While a delivery method that considers

these requirements could have been used, GOJ only allows DBB through JFIP procurements.

- c. Political Environment: The mutual cooperation shared between the United States and Japan somewhat ensures support for each other's presence. Though waterfront infrastructure replacement can be executed through existing processes, any project that expands the footprint of the U.S. military is heavily scrutinized, where projects such as these are not normally approved.
- d. Flexibility Needs: Since the approval process traditionally takes over 4-years, requirements may change from the time of conception until the actual award. The procurement process must have flexibility in it post-award and during construction.
- e. Design Process Interaction: The lengthy approval process, justification, and approval necessitates that the Navy has extensive design process interaction. The contracting process must allow for uncomplicated design alternations necessary to meet JFIP approval streams, as well as U.S. Congressional concurrence.
- f. Shared Capabilities: As is the case for NAVSTA Norfolk, BOT is not considered for this location. This is discussed in greater detail under the Foreign Economic Driver.
- g. Preconstruction Services Needs: The overseas location requires that designers who reside elsewhere visit the site, in conjunction with the design steps. NAVFAC has a listing of projects where pre-construction award services (PCA) were insufficient to produce acceptable and executable designs. This is mentioned not to place liability, but to emphasize the necessity for on-site reviews.
- h. Financial Constraints: Financial constraints are limited to the availability of JFIP funds. In this unique case, the funds are available when the waterfront construction supports TMCS requirements. Once the JFIP project is awarded, GOJ places the completion risk on the contractor. MILCON approvals are minimal.
- i. Security: The existence of CFAY waterfront facilities is in response to national security objectives, and their general composition and location is sensitive. In the case of this application, there is no affect on the delivery method, as GOJ executes the procurement MP. Waterfront security and site access is maintained through standard permit request.
- j. Manpower Displacement: No existing JFIP contracts result in the direct reduction of employees.

- k. **Summary:** Based upon the drivers above, only DBB is allowed and used. However, if permitted, Table 7-2 shows the delivery options available to procurement officials. The CM, DB-FP, T-FP, and BOT alternatives were eliminated. DB-FP and T-FP do not allow the design and construction flexibility necessary in the overseas environment.

	GC-FP	GC-R	CM	MP	DB-FP	DB-R	T-FP	T-R	BOT
Long-Term Facility Need	X	X		X		X		X	
Short-Term Facility Need									
Fastrack Schedule (Gordon 1991)									
Sequential Schedule (Gordon 1991)	X	X		X		X		X	
CONUS - Political									
OCOUS - Political	X	X		X		X		X	
More Flexibility (Gordon 1991)		X		X		X		X	
Less Flexibility (Gordon 1991)									
Design Interaction (Gordon 1991)	X	X		X		X		X	
Less Design Interaction (Gordon 1991)									
Shared Capability									
Non-Shared Capability	X	X		X		X		X	
Pre-Construction Advice Needed (Gordon 1991)		X				X		X	
No Pre-const Advice Needed (Gordon 1991)									
Financial Constraints	X	X		X		X		X	
Security Constraints	X	X		X		X		X	
Manpower Constraints									

Table 7-4 Consequence of Driver on Delivery Method Options

7.5.1.3 Foreign Country Drivers

- a. **Political Impact:** In this situation, the operational mission of the U.S. Navy is integrated with that of its host country of Japan. Though the Japanese media and politicians routinely discuss the amount of acreage, the actual presence of the United States is never questioned with any vigor. The impact of political criteria is in the crafting of each contract, however, the sole procurement strategy executed by GOJ is DBB with MP.

Japan's Ministry of Environmental stood up as an independent organization in FY2001.⁷⁷ FGS and permitting standards are being negotiated, which may stall future procurement until the new system is fully in-place.

- b. Foreign Laws and Restrictions: Currently, there are no restrictions to the use of GC, MP, DB, or T-R methodologies by the Government of Japan (GOJ) or its laws. Existing limitations are those self-imposed by the GOJ and U.S. components. The SOFA provides a legal umbrella for all U.S. military and civilian in the case of legal disputes. American citizens present in Japan are provided military counsel in the event of legal disputes, contract claims, or litigation. Also, arbitration is available as a viable disputes resolution.
- c. Economic Factors: The option to use a BOT or similar methodology does not exist. In support of the TMCS and domestic labor practices, the government of Japan provides a salary subsidy for all Japanese workers employed on U.S. military installations. Referred to as the Mass Labor Contract (MLC), MLC works are provided over 50% of salary and 100% of retirement benefits by the GOJ.⁷⁸

7.5.1.4 Finance Drivers

- a. Available Financing: Once projects are justified, their cost are negotiated with GOJ. The TMCS allows for termination one year after either the U.S. or GOJ notify the other, that it desires to terminate the Treaty. GOJ has long recognized that the quality of construction directly affects future O&M costs. In that regard, GOJ approves and funds major projects with high quality construction specifications.
- a. Equivalent Uniform Annual Cost (EUAC): Historical waterfront expenditures were captured for NAVSTA CFAY expenditures. FSM projections are shown adjacent to the ICCs.⁷⁹ CFAY historical ICC expenditures are an aberration, as GOJ funds much of the new construction. The consistent rollover into new facilities as each reaches its life expectancy, results in lower than normal funds requirements and executions.

⁷⁷ CFAY Command regional PWO briefs.

⁷⁸ CFAY Command regional PWO briefs.

⁷⁹ ICs were presented in Chapter 3. ICC 03:Waterfront Operational Facilities; ICC 04:Other Operational Facilities; ICC 07:Shipyards Maintenance and Production Facilities

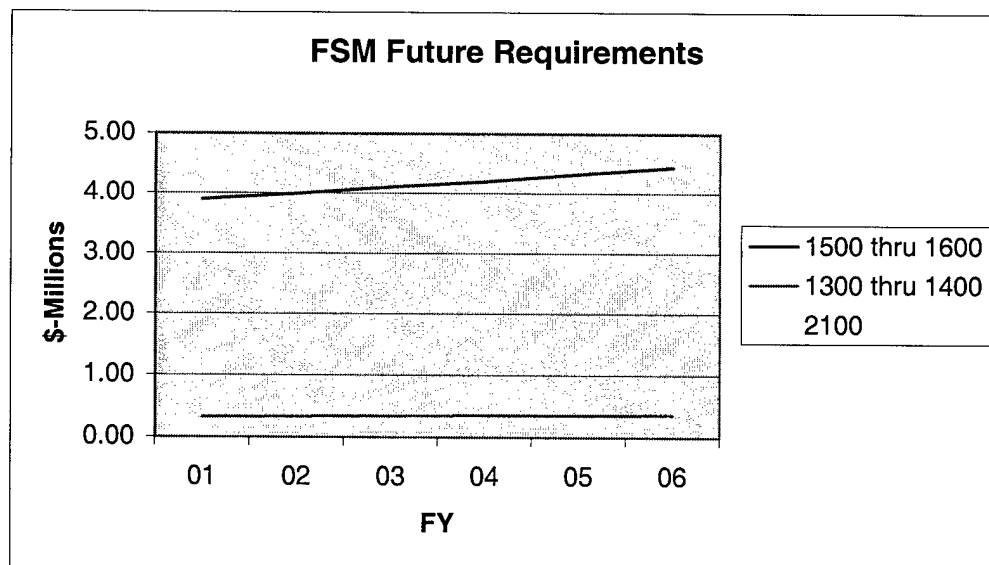
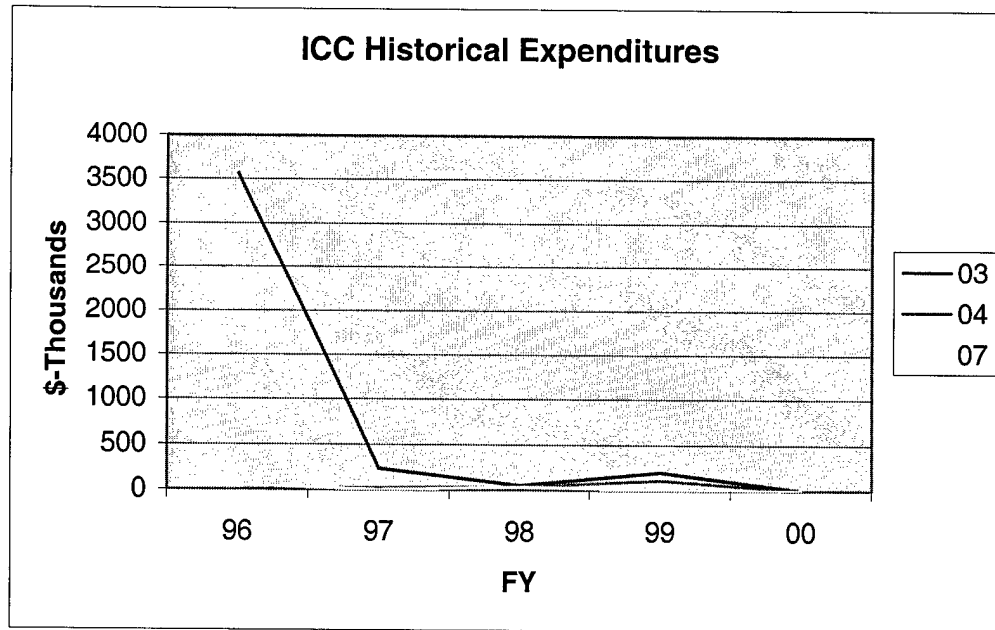


Chart 2 Historical ICC Expenditures and Future FAC Requirements

During the peak period of Kosovo Operations, there was a historical drop in O&M spending throughout the Navy and this is the explanation for the reduce spending in FY1998. The exception was for operational facilities directly in support of Kosovo efforts, such as Norfolk. Additionally, the event of regionalization has resulted in the lack of budget accuracy, as MC for CFAY installations haphazardly switch over from NAVFAC to CINCPACFLT.⁸⁰ Though, not all have done so to date.⁸¹ Similar to the

⁸⁰ Commander, Pacific Fleet located in Pearl Harbor, Hawaii.

⁸¹ The Defense Logistics Agency is an example of a budget transfer to the MC that is pending.

NAVSTA Norfolk FSM data, the short-term trend does not indicate a replacement period for which the waterfront facilities should inherit the *challenger*.

- b. Regionalization: The PWC located at CFAY has historically taken an oversight position of outlying naval bases. PWC Yokosuka provides public works support to all U.S. military bases in terms of Archview/GIS planning; and public works oversight to naval bases in Kamiseya, Misawa, Atsugi, Iwakuni, Sasebo, and Okinawa. During regionalization, CFAY, FISC, and SRF SCE combined into one Facility Management Office, and acts as the Master Planning and coordination for all of the FIP projects.

7.5.1.5 Market Drivers

- a. Availability of Appropriate Contractors: The Japanese construction market is a world leader and has sophisticated contractors.
- b. Five Forces Impact: The Japanese Market has many portals for which GOJ and NAVFAC can enter the market and issue solicitations. The NAVFAC contracting authority for Japan lists all solicitations via the web, thus leveraging the technology capabilities of the contractors. All parties in the Chain routinely communicate electronically. Although the market is segmented to the extent to promote competition, it is linked through IT so that it can execute business smartly. The sheer sizes of the JFIP projects attract industry leaders in Japan.
- c. Package Size of Product: The four MILCONs were strategically packaged to include all associated work on each pier. This ensures a single contractor is accountable for the entire work along their part of the waterfront. The Japanese construction market can bare the size of each package.
- d. Current Capabilities: NAVFAC posses in-house capability to inspect these projects with existing labor, if necessary. It also has the staff to coordinate in the event of JFIP construction.
- e. Procurement Effects to Promote Leadership Competition: The type of contracts that NAVFAC issues takes advantage of technology industry advancements. It uses the Factor Conditions (Porter 1995) in order to better attract competing firms and reduce the overhead costs of maintaining waterfront facilities. In 1990, the Civil Engineering Research Foundation (CERF) undertook a study of methods that Japan took to advance R&D in the construction industry (CERF 1991). The result were that Japan is more

advance than the United States in terms of leveraging its Factor Conditions and advancing the R&D in its industry. The results can be seen in the significant construction projects that were successfully undertaken in the 1990s.⁸²

Through syndication of construction technology information, NAVFAC is able to apply discoveries in contracting methodologies and technologies back to the NAVFAC Corporate headquarters in Washington DC, where it is syndicated to the field offices.

U.S. military projects overseas allow for Demand Conditions to be transferred to overseas markets. By requiring that U.S. standards be adhered to overseas, domestic contractors have opportunities to participate on jobs in Yokosuka, providing that they can obtain the proper clearances and local permits or if they should only act in the capacity of as an advisor.

f. Impact to the Role of Chance: By limiting the types of solicitations and awards issued by NAVFAC, the role of Chance is somewhat reduced.

g. Summary: Based upon the Market Drivers, no other delivery methods were eliminated.

7.5.1.6 Commitment

The review of Market Drivers yields no additional elimination of delivery methods options from those already completed in the previous sections. GOJ and CFAY adeptly applied the use of DBB methodology to the four JFIPs. DB-R and T-R were retained, since they would be appropriate methods if there were no limits on delivery methods. Based upon *Tier One*, the following delivery methods should be eliminated and a commitment made to move into *Tier Two*:

Eliminate: CM, DB-FP, T-FP, BOT

Retain: GC-FP, GC-R, MP, DB-R, T-R

7.5.2 *Tier Two*: Risk Assessment and Allocation

7.5.2.1 Assess the Risk

From this author's personal experience, the role of risk is lower in the Country of Japan, than that of the United States. In the two years of acting in the capacity of a warranted⁸³ Navy Contracting Officer in Okinawa Japan, there were zero claims. The integrity and ethical honor

⁸² Hoshou Bridge, the Osaka International Airport, and the list goes on and on.

⁸³ Warrant refers to the procurement official's authorization to make financial commitments on behalf of the United States Government.

code indelible to the Japanese culture reduces the impact of construction and financial risk. Litigation is viewed as a last resort, and nearly a dishonorable means of contract dispute resolution. The resulting risk assessment is in the impact of Chance. This can be weather (i.e. a heavy typhoon season), global conflict, design risk from CONUS architects/engineers (A/E), or Japanese market fluctuations.

Another significant factor is cultural, language, and environmental considerations. Through proper education and acclimation, cultural and language barriers can be overcome. The FGS⁸⁴ provide for a joint environmental standard to be maintained and acts as guidance for contractors doing business with the U.S. Navy aboard. NAVFAC procurement officials need to be aware of evolving Ministry of Environmental standards. All of these issues should be watched for, as the winning contractor's success determines whether the project is completed.

7.5.2.2 Allocate the Risk

The predominant allocation of the risks listed above should be weighed against the Navy, as has been done elsewhere in the world. The CERF study indicated an encompassing guideline when it issued the results of its 1990 study. "A more effective method should be established for limiting and distributing the unavoidable risks...." (CERF 1991). In this case, the cultural and language risks can be abrogated through training. However, environmental risk should be placed with GOJ and their DBB procurement team.

7.5.3 Tier Three: Commodity versus Service

The experience of the Japanese construction market in waterfront facilities is extensive. While this was viewed as a service in the CONUS, JFIP contractors would bid against these MILCONs as a commodity. In this case, the market can bear awards based upon price, and NAVFAC can still enjoy the benefits of a quality product.

7.5.4 Combined Fleet Activity Yokosuka Conclusion

The *Three-Tiered* Framework revealed that GOJ and CFAY applied the low-risk approach in awarding the JFIPs by DBB, as the contractor assumed all of the risk and GOJ acts as the contracting authority. There are two primary issues highlighted by the Framework application.

First, NAVFAC could have used the delivery methods of GC-R, DB-R, or T-R in order to advance its knowledge of military construction expertise in the Japanese market. Their

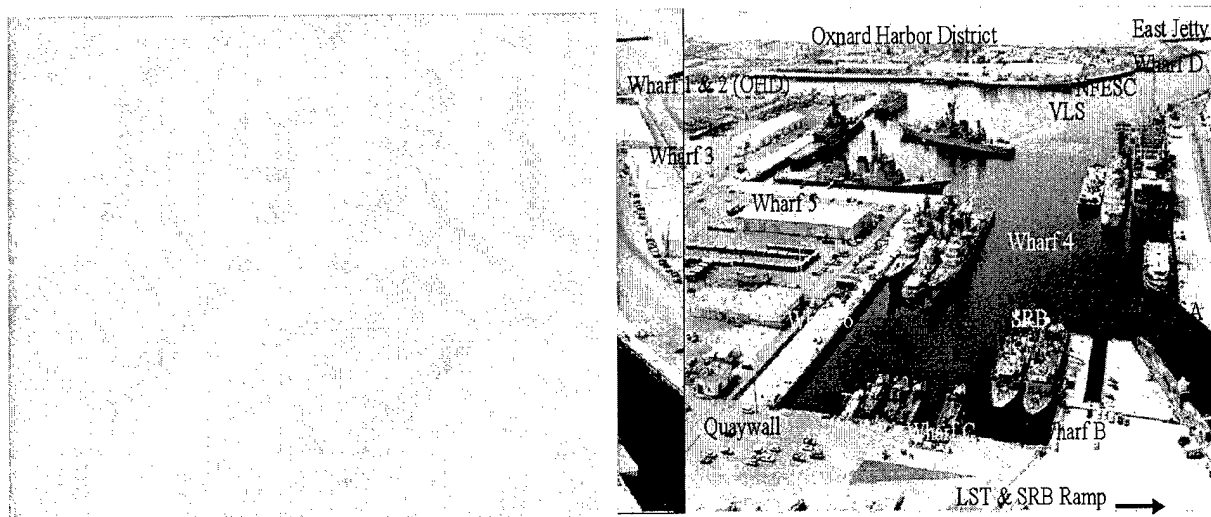
successful completion of major domestic infrastructure projects suggests that U.S. procurement officials and engineers could learn much from Japanese construction industry leaders. The *Three-Tiered* Framework suggests that a thorough analysis of the Market be required in order to craft the procurement.

Second, the affect of Foreign Country drivers usurped the ability of component procurement officials to apply any method, other than DBB. Although this seems appropriate in that GOJ is funding the work in their country, NAVSTA's mission to maintain serviceable operation infrastructure is challenged. This application emphasizes the loss of positive control by installation managers at overseas bases.

⁸⁴ Final Governing Standards as discussed in Chapter 6.

7.6 Naval Base Ventura County

Naval Base Ventura County (NBVC) is the regionalization product of two once separate navy installations, Construction Battalion Center Port Hueneme and Naval Air Station Point Mugu, located approximately 15 miles apart and 60 miles north of the City of Los Angeles. Regionalization in the area commenced in October 1998 and NBVC was officially stood-up as a naval command on the first of October 2000 (NBVC). NBVC comprises over 6,090-acres of land, a 36,000 square-mile integrated sea testing range, approximately 10-Million square-feet of facilities, and provides support to over 19,000 personnel. San Nicolas Island, located 60 miles off shore, offers an airfield to launch full-scale target drones and an emergency airstrip, if needed.⁸⁵ NBVC provides the only military controlled deep-draft pier between San Diego to Washington State. The gains in efficiency from regionalization in the Ventura area are still being measured. Below is a map of the waterfront area of NBVC.



Map 4 Plan of Naval Base Ventura County

⁸⁵ Interview with CDR R. Clarke, Public Works Officer NBVC.

Waterfront facility management is provided by a PWD. Personnel, operating costs, facility investments, etc are supported by direct funds from NBVC. Because if this, the funds allocation and appropriation are historically lower than that of bases maintained via PWCs. Although the base has enjoyed several years of BRAC construction, this is winding down now and the installation CO is faced with balancing competing priorities. Long-term affects of low base budgets on new installations are predictable, where lower capital investments in infrastructure are usually the outcome.

NBVC currently has three upcoming MILCONs to which the framework is applied. Each is being crafted as DBB, and none are award at the time of this thesis.

Pier Berth Name	Pending MILCON	Comments
3, 4, 5, 6	P-532, Port Improvements FY03, \$10.75M	Various port improvements and modernization.
3, 4, 5, 6	R47-99, Repair Wharves 3,4,5,6, FY02, \$1.836M	Critical wharf repairs for serviceability.
A, B, C	R48-99, Repair Wharves A,B,C, FY02, \$3.469M	Critical wharf repairs for serviceability.

Table 7-5 Waterfront MILCONs at NBVC California

7.6.1 Tier One: Navy, Project, Foreign Country, Finance, Market Drivers

7.6.1.1 Navy Drivers

- a. Requirement: NBVC waterfront facilities are a key to the strategic readiness on the West Coast. The installation is the host to four-Naval Mobile Construction Battalions that use roll-on and roll-off ships extensively. Port operations must be ready to accommodate large shipments of construction material and equipment upon 48-hours notice.⁸⁶
- b. Force Protection: The location of NBVC is in a low threat level and port facilities are accessible to the general public. Though certain base areas are secured, construction contractors enjoy plenty of lay down space and job site accessibility.
- c. Master Plan: There are no plans for pier expansion in the existing master plan. For the duration, routine maintenance and regional BOSS contracts cover the need repairs.
- d. Construction Sophistication: Based upon the limited scope of work for the three P&W repairs, NAVFAC has the in-house capability to inspect and administer the contracts.

⁸⁶ 48-hours is the NMCBs lead-time to deploy personnel, construction material, and equipment.

- e. Risk Aversion Modified: Major combatants are not homeported at NBVC, and though maintaining port operations is imperative, reducing the availability of waterfront facilities for short periods will not adversely affect the mission readiness of the installation. Conversely, loss of the airfield services at Point Mugu would have a direct impact on mission readiness and ability to execute the mission.
- f. Restriction of Methods: As with NAVSTA Norfolk, no restriction exists other than those delivery methods not currently allowed by NAVFAC or the FAR. There are currently no waterfront design-build efforts ongoing at NBVC.
- g. Socio Economic Consideration: NBVC hosts a strong labor union that maintains the rights of base employees. The three upcoming MILCONs have no affect on available personnel jobs.
- h. Other Drivers: NBVC Port Hueneme was selected by the CNO as the Navy's Energy Showcase Installation. New construction is scrutinized for overall building footprint, natural day-lighting, photo-voltaic system, gray water recovery, and other energy saving measures. This effort applies to future waterfront facilities and will need to be considered as a driver in the procurement cycle.

7.6.1.2 Project Drivers

- a. Term of Facility Need: The purpose of the port facility is to support the operation mission of the homeported NMCBs and oceanographic research. The requirement is considered to be long-term.
- b. Time Constraints: At this time, the contracts will be crafted to allow work to be staggered, so that not more than three of the six P&Ws are incapacitated at one time.
- c. Political Environment: The threat level is low and the local community supports NBVC's presence. These three contracts do not pose a political risk.
- d. Flexibility Needs: Since the contracts cover all six P&Ws, the Navy requires some flexibility in executing the work. This would be in the event of a differing site condition once work began, or any stop work requirements to open the piers for usage. However, there is no need for excessive flexibility as to the design, as the work is simple.
- e. Design Process Interaction: The repairs are routine, and do not involve other than normal temporary utility relocations. Extensive design process interaction is not necessary.

- f. Shared Capabilities: The construction will not increase nor decrease the existing waterfront. BOSS contracts that may cover servicing of the waterfront may need to be temporarily modified, however there is no long-term impact.
- g. Preconstruction Services Needs: None required outside of routine design efforts.
- h. Financial Constraints: The primary constraint is that the project cannot exceed the appropriated congressional price. Escalations would need to be executed with contingency MILCON funds from the year of award.
- i. Security: This work is not sensitive to national security, and several commercial ports can provide husbanding services in the event the NBVC waterfront is inaccessible.
- j. Manpower Displacement: This is not applicable since BOT is not an option available.
- k. Summary: Based upon the drivers listed above, GC-R, CM, DB-R, T-R, and BOT are eliminated as potential delivery methods. Each of the reimbursable options was not programmed into the MILCON funding request.

	GC-FP	GC-R	CM	MP	DB-FP	DB-R	T-FP	T-R	BOT
Long-Term Facility Need	X			X	X		X		X
Short-Term Facility Need									
Fastrack Schedule (Gordon 1991)									
Sequential Schedule (Gordon 1991)	X			X	X		X		X
CONUS - Political	X			X	X		X		X
OCONUS - Political									
More Flexibility (Gordon 1991)									
Less Flexibility (Gordon 1991)	X			X	X		X		X
Design Interaction (Gordon 1991)									
Less Design Interaction (Gordon 1991)	X			X	X		X		X
Shared Capability									
Non-Shared Capability	X			X	X		X		X
Pre-Construction Advice Needed (Gordon 1991)									
No Pre-const Advice Needed (Gordon 1991)	X			X	X		X		X
Financial Constraints	X			X	X		X		X
Security Constraints									
Manpower Constraints									

Table 7-6 Consequence of Drivers on Delivery Method Options

7.6.1.3 Foreign Country Drivers

NBVC is a CONUS installation and these drivers are not applicable.

7.6.1.4 Finance Drivers

- a. Available Financing: As mentioned under the project financing sector of this Chapter, the delivery method chosen must not consciously allow for cost overrun to occur, as the escalation on MILCON projects is not normally authorized, and funds may not be available.
- b. Equivalent Uniform Annual Cost (EUAC): Historical waterfront expenditures were captured for Ventura expenditures.

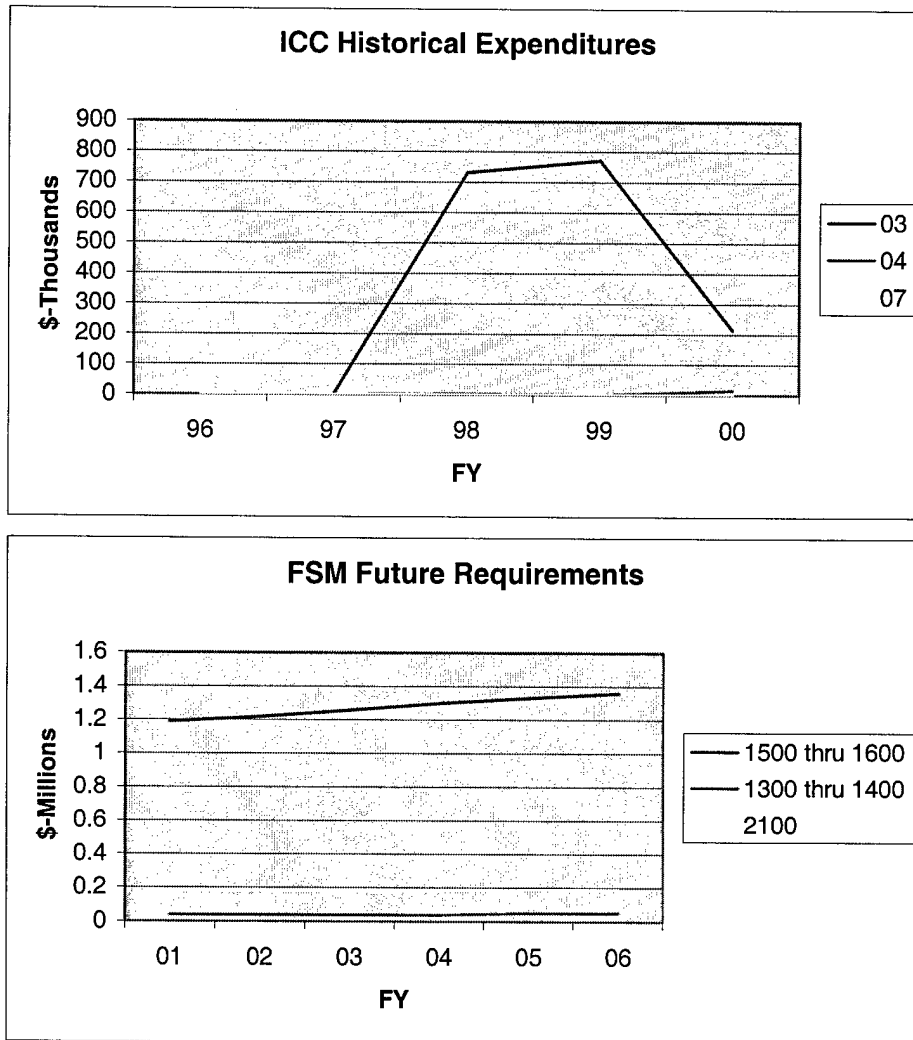


Chart 3 Historical ICC Expenditures and Future FAC Requirements

- c. Regionalization: Regionalization has had some affect on the three MILCONs presented for NBVC, as it has increased the uncertainty of future budget allocations in support of these facilities. Considering that the regional budget would be applied to airfield operations at Point Mugu as a higher priority than waterfront facilities, the degradation of waterfront facilities could possibly be unavoidable.

7.6.1.5 Market Drivers

- a. Availability of Appropriate Contractors: The Oxnard/Ventura county market possesses an abundance of contractors who can complete the work required for the three

MILCONs. In this case, the Navy need only ensure that its solicitation⁸⁷ are prepared and executed properly.

- b. Five Forces Impact: The process by which the contracting officer executes the projects is closely monitored by industry as indicators of future work relationships. NAVFAC is leveraging technology by implementing “paperless” contracting. Projects of this size could take advantage of BPM portals. Also, NAVFAC must be weary of contractors who have high exit barriers and bid on NBVC jobs, as they have no other alternatives.
- c. Package Size of Product: The bundling of similar waterfront work drove the package size of the projects. To efficiently execute the work and funding request, the backlog of real property maintenance records were combined into three MILCON packages and submitted for congressional approval. The affect on the market is that bidders may gain efficiencies in the work and potentially submit lower bids. Since NBVC has many competing priorities, the MILCON alternative serves to have the repairs completed with funds other than the installations.
- d. Current Capabilities: NAVFAC has the staff to properly award and monitor the work.
- e. Procurement Effects to Promote Leadership Competition: From interviews with the PWD, the impact of Determinates is not being actively considered in the crafting of the three MILCON procurements. From this author’s viewpoint, the issuance of MILCON work, vice completing the repairs by smaller multiple award contracts, is significantly more efficient and attracts larger firms. Therefore, the inadvertent result of the existing procurement process is a bolstered Demand Condition (Porter 1995).
- f. Impact to the Role of Chance: The support of Congress towards installation maintenance, the political relationship with the State of California, and environmental regulations all play significant roles on Chance. NAVFAC and the installation can attempt to influence them, but do not have control over any.

7.6.1.6 Commitment

Naval Base Venture County hopes to apply the DBB methodology successfully.⁸⁸ Based upon this *Tier One*, the following delivery methods should be eliminated and a commitment made to move into *Tier Two*:

⁸⁷ Solicitation is referred to here as the plans, specifications, and advertising process.

⁸⁸ NAVFAC success is based upon delivering on time, on budget, and with high quality. Though these MILCONs are ongoing, they brief well as to the three NAVFAC indicators.

Eliminate: GC-R, CM, DB-R, T-R

Retain: GC-FP, MP, DB-FP, T-FP, BOT.

7.6.2 *Tier Two: Risk Assessment and Allocation*

7.6.2.1 Assess the Risk

The predominance of risk for these three projects are earthquake or demand usage for the P&W that impact the contractor's accessibility to the construction site. The opportunity for earthquake is significant in the region of NBVC. Included in the contract are provisions delineating contractor actions in the event of an earthquake. These include securing on-site material and reports as to any damage to the work area. As a second example, the contractor may have to stop work in the event of mission tasking that requires the use of the pier.

7.6.2.2 Allocate the Risk

In both cases discussed above, it is in the Navy's interest to keep both risks to itself and not allocate them to the contractor. Allocating these would make it near impossible for contractor to propose accurate bids and will result in higher than true costs.

7.6.3 *Tier Three: Commodity verse Service*

The scope of the three MILCONs is routine repair and maintenance. The award based upon price is more than adequate considering the low technical scope of work.

7.6.4 Naval Base Ventura County Conclusion

The framework and research brought to light several issues:

First, NBVC's option to pursue GC-FP DBB procurement is determined to be allowable by the framework standards. However, this author feels that T-FP and BOT could have been considered, as the work being performed by the MILCON is recurring and a long-term maintenance contract that incorporates the repair could potentially have served the mission better. Although BOT is not the NAVFAC preferred method, transfer of the waterfront readiness risk from the installation to the contractor coupled with long-term concession periods will attract larger firms willing to establish, or maintain close relationship with military installation construction.

Second, while the effect of regionalization is still being benchmarked, the event of regionalization has inadvertently resulted in the inability to accurately acquire historical

budget records from the installation comptroller. The NBVC comptroller department purged historical fiscal records prior to FY1999, ⁸⁹ and the resulting data loss makes determining historical accurate past expenditures impossible.

⁸⁹ Per on-site data collection with Mr. Gary Rainwater and Mr. Ken Luper, NBVC Comptrollers and Deputy Comptroller, respectively.

7.7 Naval Station Roosevelt Roads Puerto Rico

The waterfront facilities of Naval Station Roosevelt Roads Puerto Rico (NAVSTA RR) support transient ships for Caribbean operations, and often include U.S. and international navies. Although there are no homeported ship or submarines at NAVSTA RR, it supports 20 ships on average at any one time. The waterfront facilities include 10 piers and a wide range of CISE in order for visiting ships to subsist off of shore support. The ancillary testing range on Vieques has been the topic of multiple international news stories over the past year.

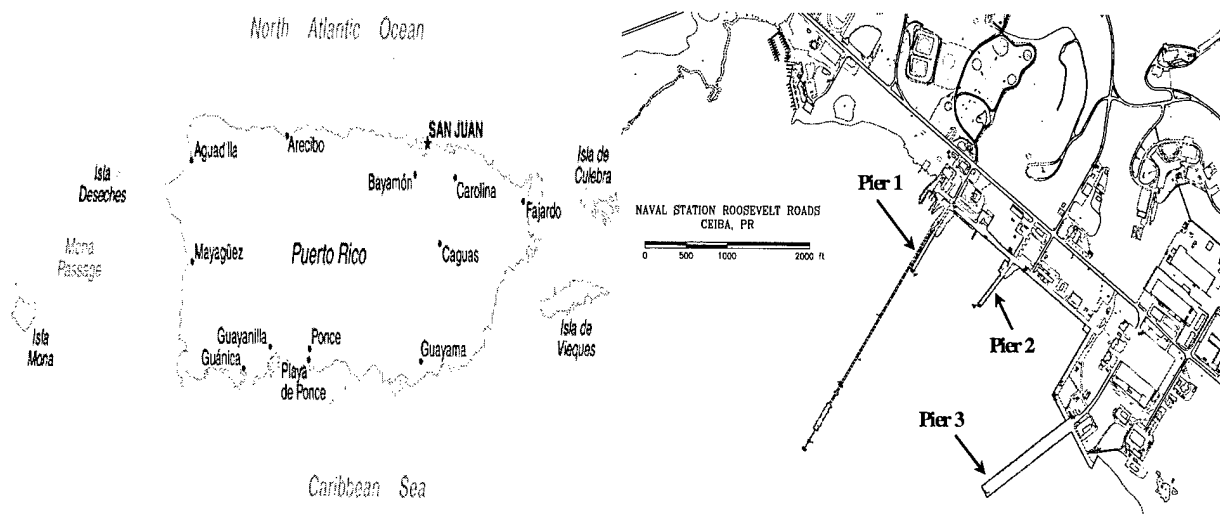


Figure 7-1 Map of Puerto Rico

NAVSTA RR infrastructure management is supported by a PWD, which like NBVC receives direct funding from the station. There are currently three active MILCONs and one major locally funded project that the framework will be applied to. The projects are listed in table 7-1 below:

Pier Berth Name	Pending MILCON	Comments
FPB1	Pier refurbishment**	Refurbishment complete to repair Hurricane Gorges damage.
P1B1	MILCON Pier repair	MILCON project currently in-progress to upgrade pier.
P3B1; P3B2; P3B3; P3B4	MILCON Pier repair	MILCON project to repair Hurricane Georges damage in-work.

**The Pier Refurbishment on FPB1 is not a MILCON, but is included in the analysis as an ongoing project.

Table 7-7 Waterfront MILCONs at NAVSTA Roosevelt Roads

7.7.1 Tier One: Navy, Project, Foreign Country, Finance, Market Drivers

7.7.1.1 Navy Drivers

- a. Requirement: NAVSTA RR maintains a strategic position for the United States in support of South American operations, Coast Guard patrols, and presence in the territory. The large number of transient ships located at the installation supports requires that the facilities be maintained.
- b. Force Protection: NAVSTA RR is a closed base, where access is controlled at the front gate and at the entrance to the port facility within the base. Civilian contractors must obtain specific passes in order to work in the waterfront area, as access is limited.
- c. Master Plan: The master plan, crafted from the installation's required operating capabilities, mandates that the waterfront be capable of supporting a myriad of ships. These include FFGs, DD/DDGs, AOE/AORs, SSBNs, and ships from international navies. The MILCONs do not overlap an existing capability.
- d. Construction Sophistication: NAVFAC possess the in-house sophistication to administer the major project and the three MILCONs.
- e. Risk Aversion Modified: NAVFAC is executing this work by DBB. Since there are only 10 piers and all are affect by the projects, the installation CO is risk adverse. The capability loss of one pier equates to a reduction of 10% in mission readiness. The method chosen should not allow for contractual loss of control on the Navy's part.
- f. Restriction of Methods: U.S. contract laws govern Puerto Rico. No restriction exists other than those delivery methods not currently allowed by NAVFAC or the FAR
- g. Socio Economic Consideration: NAVFAC executes a large number of small business and minority set-aside procurements. The impoverished income levels are bolstered through NAVSTA RR procurements and employment that provide a continuous revenue stream to the local economy. The four projects are being procured via DBB GC-FP.⁹⁰

⁹⁰ Interview with CDR Jeff Borowy, NAVSTA RR Public Works Officer.

- h. Other Drivers: While waterfront projects at NAVSTA RR are not the focus of political turmoil, projects that expand the capabilities of the Navy ashore are highly subject to local admonishment.

7.7.1.2 Project Drivers

- a. Term of Facility Need: The U.S. has a long presence in Puerto Rico. The term of the facility need is indefinite, and the investment into waterfront infrastructure is necessary.
- b. Time Constraints: There are no existing time constraints on the projects, and Fast Tracking is not necessary.
- c. Political Environment: The movement of the contractor in the waterfront area must be closely controlled, as a matter of base security. While relations are good with the citizens of Puerto Rico, the installation CO is cautious of not becoming complacent and allowing contractors the ability to move freely around the base.
- d. Flexibility Needs: The scope of the projects is basic repairs and there is little need for design flexibility after award, other than that already included in the standard boiler-plate specifications.
- e. Design Process Interaction: As mentioned in the previous driver, the repairs are basic and there is minimal design interaction that is necessary.
- f. Shared Capabilities: The projects did not consider future O&M, so this driver is not applicable.
- g. Preconstruction Services Needs: Although the design is basic, there is a need for PCAS⁹¹ services, as the A/E will more than likely be from CONUS. The A/E will be required to come on-site to verify existing conditions and site surveys.
- h. Financial Constraints: NAVSTA RR chose to pursue the award of three MILCONs and one station funded project. The MILCON projects are constrained to the limits of the project appropriations. The station funded project is limited by the "Out of Scope Modifications" clause of the FAR (FAR43).
- i. Security: None of the projects analyzed in this Chapter are sensitive to national security.
- j. Manpower Displacement: None of the four projects impact the employment of station workers or consider operations as a part of the procurement process.

⁹¹ Pre Construction Award Services

- k. Summary: Several delivery methods were eliminated as available options, to include GC-R, CM, DB-R, and T-R. Each of the reimbursable delivery methodologies was eliminated, as NAVSTA RR desires to maintain positive control over the project costs. Though the BOT methodology is retained as an option, the Navy is sensitive to local employment and economic balance. This author chose not to eliminate this methodology since it could potentially be applicable, provided properly executed so that there is some conciliation to the any displaced NAVSTA RR employees.

	GC-FP	GC-R	CM	MP	DB-FP	DB-R	T-FP	T-R	BOT
Long-Term Facility Need	X			X	X		X		X
Short-Term Facility Need									
Fastrack Schedule (Gordon 1991)									
Sequential Schedule (Gordon 1991)	X			X	X		X		X
CONUS - Political									
OCNUS - Political	X			X	X		X		X
More Flexibility (Gordon 1991)									
Less Flexibility (Gordon 1991)	X			X	X		X		X
Design Interaction (Gordon 1991)									
Less Design Interaction (Gordon 1991)	X			X	X		X		X
Shared Capability									
Non-Shared Capability	X			X	X		X		X
Pre-Construction Advice Needed (Gordon 1991)					X		X		X
No Pre-const Advice Needed (Gordon 1991)									
Financial Constraints	X			X	X		X		X
Security Constraints	X			X	X		X		X
Manpower Constraints									

Table 7-8 Consequence of Drivers on Delivery Method Options

7.7.1.3 Foreign Country Drivers

Puerto Rico remains a locally self-governing unincorporated territory of the United States, where all U.S. laws extend to the territory (USC 43). The exceptions are some internal

revenue laws. For purposes of this thesis, Puerto Rico is considered a domestic market. As an U.S. Territory, it enjoys similar privileges and laws than that of each of the States, with respect to contract procurement. There are, however, some factors to be considered as shown below:

- a. Political Impact: Although Puerto Rico enjoys all the privileges of statehood, there is a significant amount of indicated corruption in the political system. The process for contract awards is similar to that of the CONUS, however, procurement officials are aware of permit deals, favoritism of local workers, and the mission of the Navy to be good trustees of the land in which the installation encompasses.
- b. Foreign Laws and Restriction: No foreign laws exist, except the some internal revenue reporting requirements.
- c. Economic Factors: The World Bank lists Puerto Rico as a “developing country” (World Bank 2000), and it does exceed the average statistics of developing countries in terms of infrastructure and general international economic and trade indicators. For the purposes of NAVFAC procurements, Puerto Rico is considered to be a highly sensitive economic area that is heavily influence by major swing in the NAVSTA’s demand for good and services. All contracting actions are carefully reviewed for their impact on local economic conditions.

7.7.1.4 Finance Drivers

- a. Available Financing: MILCON and local financing is very limited. Justification of budget increases and expenditures is difficult, as there are no homeported U.S. vessels. Should waterfront installations fail to meet mission requirements, husbanding services⁹² can be purchased from other local ports, but this is not performed.
- b. Equivalent Uniform Annual Cost (EUAC): Historical waterfront expenditures were captured for NAVSTA RR. The spike in FY1999 was due to a large fiscal year end dump of funds from CINCPACFLT, where much of it was used to repair the various deteriorated waterfront facilities.⁹³ It is notable that like the City of Medford Case study (Miller 2000, page 365), NAVSTA RR is the victim of end-of-year funding ‘dumps’ that do not allow for acceptable prior planning.

⁹² Husbanding services refers to CISE and Class IV Food Subsistence support.

⁹³ Interview with CDR Jeff Borowy, NAVSTA RR Public Works Officer.

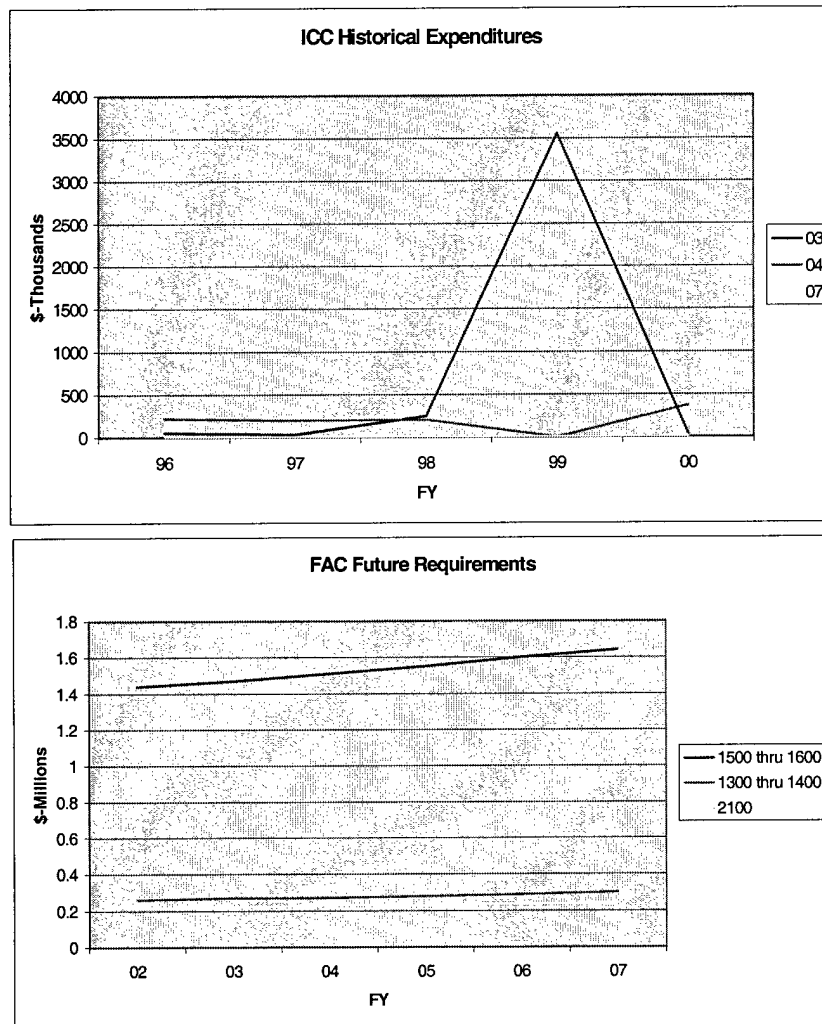


Chart 4 Historical ICC Expenditures and Future FAC Requirements

- c. Regionalization: The unique location of the NAVSTA has not allowed the base to take advantage of efficiencies gained through the regionalization process. This driver is not applicable to NAVSTA RR.

7.7.1.5 Market Drivers

- a. Availability of Appropriate Contractors: There is an adequate amount of contractors whom could execute the work for the four projects. However, it is a constant vigilance to ensure the quality of work is in accordance with plans and specifications, as the quality construction practices are not always adhered-to in developing countries.⁹⁴
- b. Five Forces Impact: The Puerto Rican construction industry is highly sensitive to economic fluctuations. NAVFAC had attempted to move to “paperless” contracting

⁹⁴ Interview with CDR Jeff Borowy, NAVSTA RR Public Works Officer.

worldwide, however, contractors could not support this in some locations. Puerto Rico is an example of where local contractors have difficulty adjusting to technological advances, as it ranks as below the norm for developing countries in terms of IT capability (World Bank 2000). NAVFAC as a buyer has a high competitive advantage over the Puerto Rican construction industry, as a supplier. It is in this area that the NAVFAC could have its biggest impact. Through careful contract solicitation, procurements that support innovative solutions could bolster the Puerto Rican construction industry. Though, this opens the Navy to completion risk should the new technology not be successful.

- c. Package Size of Product: The size of each project is adequate to capture MILCON funding and to support the submission of a fair number of bidders.
- d. Current Capabilities: NAVFAC has the capabilities to inspect and execute the procurement in-house, and without external assistance.
- e. Procurement Effects to Promote Leadership Competition: While Puerto Rico has a thriving population, it suffers from a lack of supporting infrastructure and knowledge resources, as compared to other developed countries, for example. Additionally, as in Italy, construction industry corruption is a frequent occurrence and must be watched for in the procurement cycle.⁹⁵ Fair Practices and transparent procurement process work to reduce these risks. By doing so, the barriers to entry are decreased and the bargaining power of the Navy increases, as more contractors seek to do business in Puerto Rico, via navy procurements. The result is an increase in Demand Conditions (Porter 1995), and a growth potential for Puerto Rican construction firms.

The primary concern is whether Puerto Rico supports the business practices and processes necessary to produce industry leaders. To the extent that NAVFAC is aware of the contracting and construction environment, it could recognize the leader's who are seeking to do business with the Navy.

- f. Impact to the Role of Chance: There are no opportunities for NAVFAC to effect Chance occurrences in the Puerto Rican economy.

⁹⁵ Interview with CDR Jeff Borowy, NAVSTA RR Public Works Officer.

7.7.1.6 Commitment

NAVSTA Roosevelt Roads applied the DBB methodology and has had somewhat successful results. Based upon this *Tier One*, the following delivery methods should be eliminated and a commitment made to move into *Tier Two*:

Eliminate: GC-R, CM, DB-R, T-R

Retain: GC-FP, MP, DB-FP, T-FP, BOT

7.7.2 *Tier Two*: Risk Assessment and Allocation

7.7.2.1 Assess the Risk

There are a significant number of risks associated with construction in Puerto Rico. These include construction completion, quality of materials, claims, and corruption risks. Construction completion and quality of materials are uncertain since Puerto Rico is a developing country in terms of its economy and technology. Claims have typically been the result of bad arbitration session where Navy procurement officials and contractors were at impasses. Corruption is an ever present challenge in developing countries, as people attempt to gain the most from each business transaction, as a matter of survival. By no means is the discussion of corruption meant to offend any Puerto Rican citizen, however, a prudent procurement official will recognize this and understand methods to reduce the risk.

7.7.2.2 Allocate the Risk

The allocation of these risks should be through the contract specifications, where most of the burden is placed upon the contractor. Though, the procurement official should monitor for indications of each. Construction completion and quality of materials risks can be abrogated through close QA and covered by various bonds (i.e. completion, performance, etc.). The risk of claims can be reduced by careful contract administration and partnering with the contractor. Requiring contractors to sign anti-corruption statements, with the penalty of being de-barred from public contracts if they fail to meet the statement can reduce corruption is another option. This is successfully executed in Italy, where all U.S. DOD contractors must pass the Anti-Mafia background check as part of the procurement process (Mixed Commission 2000). This by no means completely eliminates corruption, but it reduces the possibility by making it difficult for contractors to participate in illegal acts.

7.7.3 Tier Three: Commodity verse Service

The four construction projects studied in this Chapter are commodity products. The scopes of work are basic and the award was correctly based upon price. The existing qualification and procurement process is sufficient to screen-in good contractors.

7.7.4 NAVSTA Roosevelt Roads Conclusion

The Framework revealed two significant points.

First, through research gathered from the PWD, there were no attempts to review procurements in terms of industry attractiveness, as Factor Conditions were not supportive. In order to meet requirements, contracts are crafted, solicited, and awarded without consideration of specific contributions to the Puerto Rican construction industry. It is this effort that is of primary focus in this thesis. Navy procurement officials must review their installations and the contracts let in order to get the most innovation from industry, all the while not creating an environment where progress is burdened by litigation. There is an avenue for NAVFAC to promote and encourage innovative solutions in public procurements. It is this author's opinion that the Determinates of America are bolstered by creating a foreign market demand for procurements that must adhere to American standards.

Second, naval waterfront procurement must adjust itself to host nation Factor Conditions. In this case, DBB is the alternative that has the least amount of risk.

7.8 Conclusion of Framework Application

The *Three-Tiered* Framework proved to be a ubiquitous model and applicable to each of the installations. The four representative installations were specifically selected due to their diverse locations, host nation support, types of ships and submarines supported, various budget executions, and differences in PWC support verse PWD support. Results of the Framework Applications are discussed in detail in Chapter 8, however it is noteworthy that its intent withstood the various applications of naval installation with dynamically different characteristics.

8 DISCUSSION AND RECOMMENDATION

8.1 *Three-Tiered* Framework

The *Three-Tiered* Framework provides public procurement officials a model by which to procure naval waterfront infrastructure. The drivers applied to the four representative installations allow transparency, as to the actual Navy requirements since waterfront infrastructure requirements are as varied as their geographical location. As a sophisticated owner, the U.S. Navy possesses the tools necessary to craft intelligent procurements attractive to construction industry leaders. As evident by the conclusions below, the framework is flexible enough to be applied to multiple locations, and ridged enough to accommodate dynamic procurement variables.

8.2 *Three-Tiered* Framework Conclusions

The application of the framework is taken to the next iteration in this conclusion chapter by highlighting results from its application. Conclusive and supporting results serve to validate the Framework of drivers.

8.2.1 Regional Waterfront Planning

Regional waterfront planning is applied extensively at NAVSTA Norfolk. The \$700-Million program that was brief to the Senate (Johnson 2001), substantiates that Norfolk possess an intelligently crafted future year revitalization plan. The results can be seen through the eight MILCONs slated for the installation. Specific modernization efforts include double deck piers, upgraded power and utilities, and provides services such as T-1 and expanded communication lines (Mackey 1999). Through the driver framework, specifically the Master Plan and Shared Capability drivers, a regional waterfront plan would assist the installation in determining its needs and future resource requirements. In conclusion, the credibility of the portfolio presentation appears to be successful in garnering limited congressional funds.

8.2.2 Budget Tracking

Though the original intent of the author was to establish historical expenditures and future requirement trends for waterfront facilities, the data necessary to craft a definitive capital portfolios was no longer resident with the installations or the MCs. The advent of

regionalization has shuffled personnel and information such that re-creating historical ICC expenditure prior to FY1999 is not possible with complete accuracy. Previous works have validated the merit of an EUAC analysis to suggest the timing of a facility's replacement, however existing naval budget tracking systems do not make this possible. The conclusion is that future procurements that hope to leverage BOT options will require extensive studies to recreate historical obligations. Without an understanding of past expenditures, it is difficult to predict appropriate rate structures. The lack of budget detail has the potential to limit Navy procurements to traditional, and sometimes unsophisticated, delivery methods; whereby efficiencies in cost and time cannot be leverage through alternative BOT methods.

8.2.3 PWD Business Manager

The execution data presented for each of the four installations suggest that there is a difference in the ability to manage facilities between those who are support by PWCs and those supported by PWDs. The primary difference, other than shear size, is the presence of a business manager. From the personal experience of this author⁹⁶ and interviews with facility PWOs, the value-added of a business manager is counsel with regard to budget request, allocation, and execution. This author suggests that the incorporation of a PWD business manager would provide needed support to smaller installations.

8.3 Future Research Possibilities

There are several opportunities for future research and applications of the *Three-Tiered Framework*.

- ❖ An application of the *Three-Tiered Framework* on other sectors of military installations, such as airfields, housing, or BEQs, would show the Framework's resilience and applicability.
- ❖ An in-depth review of NAVFAC contractors, their competitiveness in private industry, and their rankings within the domestic and international markets could suggest a correlation to the outcome of NAVFAC procurements.

⁹⁶ The author served as the Public Works Officer and Resident Officer in Charge of Construction for Naval Support Activity La Maddalena, Sardegnia, Italy from October 1998 to August 2000.

- ❖ A Study of American Contractors in foreign Markets and vis-à-vis is another alternative. This would encompass a review of Demand Conditions that U.S. Contractors can leverage to enter overseas markets.
- ❖ Application of Porter's philosophy on Puerto Rico, to include the Five Forces model and the Determinates. Though a U.S. territory, research in this thesis and World Bank facts suggested that it is behind other developing countries in various indicators.
- ❖ Review of the Competitive Advantages and Strategies of Construction Industry Leaders, and whether public procurements could leverage the full benefit of the alternate delivery methods. Specifically, the research could analyze the hurdles to relinquishing facility management control of mission essential infrastructure.

8.4 Closing Thoughts

The *Three-Tiered* Framework is designed to promote transparency in the procurement process, all the while ensuring that the operational mission is maintained. Although the focus of this thesis is on waterfront facilities, these drivers can be applied throughout the NAVFAC facilities procurement arena for various facility deliverables. NAVFAC procurement officials, as well as all public sector procurement officials, should be cautious of implementing procurement strategies that relegate itself to a one-dimensional solution for dynamic, multi-dimensional problems. The Framework crafted in this thesis provides a method by which to minimize the risk of this occurrence.

Finally, through MIT course work and research interviews with several industry leaders,⁹⁷ some suggest that public sector procurements may possess too many limitations to innovation systemic to its process. This includes late fiscal-year budget allocations, limiting federal procurement legislation, and unforeseen mission needs that change contract requirements and increase contractor risk. It is this author's opinion that all efforts that can be made to promote *innovation*, whether it be in construction materials, IT, or process improvement, should be encourage to the maximum extent possible. Though public procurement officials have a legal

⁹⁷ Short stand-up interviews were completed with various visiting CEOs from Raytheon, Beck, Bovis, and Macomber. These industry leaders were present at MIT as part of the course 1.961 E-Commerce and the Internet in Real Estate and Construction.

responsibility as stewards of public funds, they also have a fiduciary responsibility to promote the construction industry. As such, this author feels that procurement legislation or processes that limit innovation be review to verify whether this is the intended message public procurement officers desire to send to the industry.

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Appendix A List of Acronyms

Budgeting Terms:

APN – Air Procurement Navy
DASN – Deputy Assistant Secretary of the Navy
MCN – Military Construction Navy

OPN – Other Procurement Navy
OSD – Office of the Secretary of Defense
FYDP – Future Year Defense Plan

ASN – Assist Secretary of the Navy
I&E – Installations and Environment
O&M, N – Operation and
Maintenance, Navy
UMC – Urgent Military Construction
RDT&E – Research, Development,
Training, and Equipment

FSM Terms:

CATCODE – Category Code
FAC – Facility Analysis Category
FSM – Facilities Sustainment Model
OSD – Office of the Secretary of Defense
UM – Unit of Measure

DOD – Department of Defense
FAD – Facility Analysis Database
FYDP – Future Year Defense Plan
UIC – Unit Identification Code

IWAR Terms:

AFDM – Floating Dock

AM – Ammunition Berth
AOR – Replenishment Oiler
CV – Nuclear Powered Cruiser
DD/DDG – Destroyer/Guided Missile Destroyer
DP – Deperming Berth
FL – Fueling Berth
GP – General Purpose
LHA/LHD – Amphibious Assault Ships

LST – Amphibious Landing Ship Tanks

OC – Ordnance Container Handling Berth
SC – Small Craft Berth
SSBN – Submarine Berth
SU – Supply Berth
T-AFS – Resupply Ship, part of the Military Sealift Command/Merchant Marine Fleet
T-AGOS – Ocean Surveillance Ship
Yard Aux-M – Auxiliary Yard Maintenance Ship
Yard Aux-S – Auxiliary Yard Supply Ship

AGOR – Oceanographic Research
Ship
AOE – Fast Combat Support Ship
CG – Guided Missile Cruiser
DD – Dry Dock
DG – Degaussing Berth
FFG – Guide Missile Frigate
FO – Fitting Out Berth
LCC – Amphibious Command Ship
LPD – Amphibious Transportation
Dock
Misc-M – Miscellaneous
Maintenance
RE – Repair Berth
SSN – Submarine Berth
SP – Special Purpose Berth

Measurements:

AC – Acres
EA – Each
FP – Firing Points (Ranges)
GM – Gallons per Minute
KV – Kilovolt Amperes

BL – Barrels (42 GA each)
FA – Family Units
GA – Gallons
KG – thousands of Gallons per Day
KW – Kilowatts

LF – Linear Feet
MB – Millions of British Thermal Units per Hr
OL – Outlets
SY – Square Yards
TN – Tons

MG – Millions of Gallons
MI – Statute Miles
SF – Square Feet
TH – Tons per Hour
TR – Tons (Refrigeration)

Appendix B Readiness Condition of Naval Station Norfolk Virginia

<u>Pier or Berth Name</u>	<u>Berth Type</u>	<u>Ship Type</u>	<u>Berth Size</u>	<u>Pier Width</u>	<u>Condition FY2000</u>	<u>Condition FY1999</u>
2 berth 2	GP	DD/DDG	M	168	C4	C2
2 berth 5	GP	T-AFS	M	168	C4	C2
2 berth 6	GP	DD/DDG	M	168	C4	C2
20 berth 1	GP	DD/DDG	M	48	C2	C2
20 berth 2	GP	DD/DDG	M	48	C2	C2
20 berth 5	GP	DD/DDG	M	48	C2	C2
20 berth 6	GP	DD/DDG	M	48	C2	C2
21 berth 1	GP	Misc-M	M	48	C4	C4
21 berth 2	GP	Misc-M	M	48	C4	C4
21 berth 5	GP	DD/DDG	M	48	C3	C3
21 berth 6	GP	DD/DDG	M	48	C3	C3
22 berth 1	GP	SSN	M	48	C2	C2
22 berth 2	GP	SSN	M	48	C2	C2
22 berth 5	GP	SSN	M	48	C2	C2
22 berth 6	GP	SSN	M	48	C2	C2
23 berth 1	GP	LPD	M	48	C3	C3
23 berth 2	GP	SSN	M	48	C3	C3
23 berth 3	GP	SSN	M	48	C3	C3
23 berth 4	GP	SSN	M	48	C3	C3
23 berth 5	GP	LPD	M	48	C3	C3
23 berth 6	GP	SSN	M	48	C3	C3
24 berth 1	GP	CG	M	68	C2	C2
24 berth 2	GP	CG	M	68	C2	C2
24 berth 5	GP	CG	M	68	C2	C2
24 berth 6	GP	CG	M	68	C2	C2
24T	RE	AFDM	M	na	C1	C1
25 berth 1	GP	CG	M	68	C2	C2
25 berth 2	GP	CG	M	68	C2	C2
25 berth 5	GP	CG	M	68	C2	C2
25 berth 6	GP	CG	M	68	C2	C2
25T	RE	na	M	na	C4	C4
3 berth 1	GP	T-AFS	M	168	C2	C2
3 berth 2	GP	T-AFS	M	168	C2	C2
3 berth 5	GP	T-AFS	M	168	C2	C2

Readiness Condition of Naval Station Norfolk Virginia (continued)

<u>Ber or Berth Name</u>	<u>Berth Type</u>	<u>Ship Type</u>	<u>Berth Size</u>	<u>Ber Width</u>	<u>Condition</u> FY2000	<u>Condition</u> FY1999
3berth6	CP	T-AFS	M	168	C2	C2
36(QUAY)	CP	HFG	M	100	C2	C2
4berth1	CP	LFD	M	248	C2	C2
4berth2	CP	T-AFS	M	248	C2	C2
4berth5	CP	LFD	M	248	C2	C2
4berth6	CP	T-AFS	M	248	C2	C2
5berth1	CP	HFG	M	102	C4	noreport
5berth2	CP	HFG	M	102	C4	noreport
5berth5	CP	LH/LHD	M	102	C4	noreport
5berth6	CP	LH/LHD	M	102	C4	noreport
7berth1	CP	HFG	M	102	C2	C2
7berth2	CP	HFG	M	102	C2	C2
7berth5	CP	LH/LHD	M	102	C2	C2
7berth6	CP	LH/LHD	M	102	C2	C2
7/8(QUAY)	CP	DD/DDG	M	100	C2	noreport
Berth1	SC	Msc-M	S	50	C4	C4
Berth2	SC	Msc-M	S	50	C4	C4
CNorth	SC	Yard Aux-S	S	18	C2	C2
CSouth	SC	Yard Aux-S	S	18	C2	C2
DNorth	SC	Yard Aux-S	S	18	C2	C2
DSouth	SC	Yard Aux-S	S	18	C2	C2
ENorth	SC	Yard Aux-S	S	18	C2	C2
ESouth	SC	Yard Aux-S	S	18	C2	C2
FNorth	SC	Yard Aux-S	S	22	C2	C2
FSouth	SC	Yard Aux-S	S	22	C2	C2
GNorth	SC	Yard Aux-S	S	22	C2	C2
GSouth	SC	Yard Aux-S	S	22	C2	C2
HNorth	SC	Yard Aux-S	S	28	C2	C2
HSouth	SC	Yard Aux-S	S	28	C2	C2
Lanberts Point	DP	na	na	0	C4	C4
South Will	CP	LFD	M	na	C3	C3

Appendix C Readiness Condition of Commander Fleet Activities Yokosuka

<u>Pier or Berth Name</u>	<u>Berth Type</u>	<u>Ship Type</u>	<u>Berth Size</u>	<u>Pier Width</u>	<u>Condition FY2000</u>	<u>Condition FY1999</u>
BERTH 1	GP	Misc-M	S	20	C1	C1
BERTH 10	GP	SSN	M	68	C3	C3
BERTH 11	GP	SSN	M	68	C3	C3
BERTH 11/2	GP	ARS	M	20	C1	C1
BERTH 12	GP	CV	L	52	C3	C3
BERTH 2	GP	DD/DDG	M	60	C3	C3
BERTH 3	GP	DD/DDG	M	60	C3	C3
BERTH 4N	SC	Misc-M	M	0	na	na
BERTH 4S	SC	Misc-M	M	0	na	na
BERTH 5	GP	Misc-M	M	20	C4	C4
BERTH 6	GP	CG	M	90	C1	C1
BERTH 7	GP	CG	M	90	C1	C1
BERTH 8N	GP	Misc	M	70	C1	C1
BERTH 9	GP	CV	L	82	C1	C1
Canal Dock	FL	Misc	S	34	C2	C2
DRYDOCK 1	DD	LST	L	95	C2	C2
DRYDOCK 2-A	DD	CV	L	105	C2	C2
DRYDOCK 2-B	DD	LST	L	105	C2	C2
DRYDOCK 3	DD	MSC	L	59	C2	C2
DRYDOCK 4	DD	LST	L	119	C2	C2
DRYDOCK 5	DD	LCC	L	164	C2	C2
HACHINOHE	FL	Misc	S	74	C2	C2
HARBOR MASTER PIER EAST	GP	CG	M	91	C1	C1
HARBOR MASTER PIER WEST	GP	CG	M	91	C1	C1
KOSHIBA B-BERTH	FL	Misc	M	69	C2	C2
Pier J	FL	Yard Aux-M	M	0	C2	C2
South Dock	FL	Misc	S	65	C2	C2
TSURUMI OU-1 #1	FL	Misc	M	37	C2	C2
TSURUMI OU-1 #2	FL	Misc	M	25	C2	C2
TSURUMI OU-2 #1	FL	Yard Aux-M	S	26	C2	C2
TSURUMI OU-2 #2	FL	Yard Aux-M	S	26	C2	C2

Appendix D Readiness Condition of Naval Base Venture County

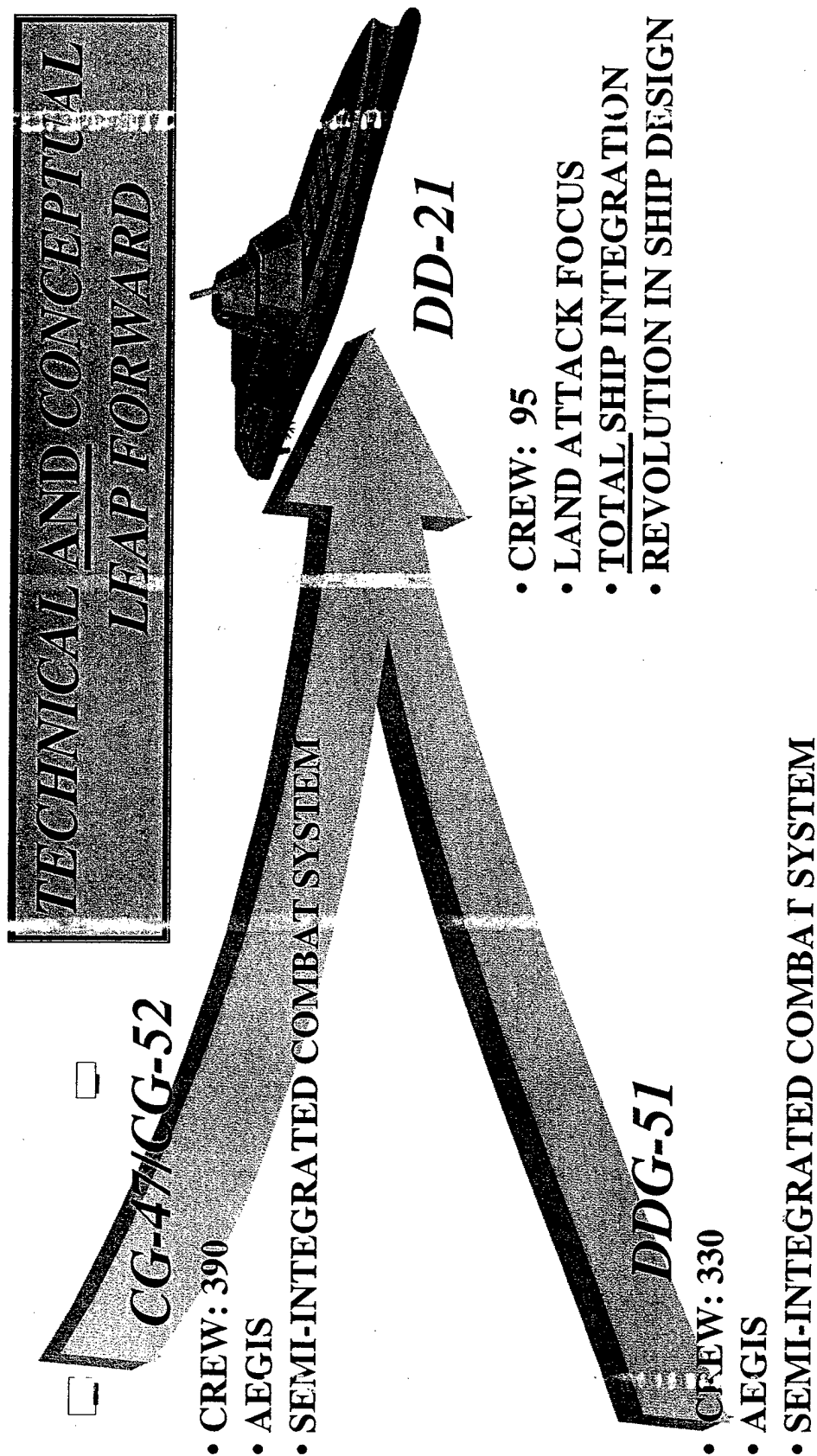
<u>Pier or Berth Name</u>	<u>Berth Type</u>	<u>Ship Type</u>	<u>Berth Size</u>	<u>Pier Width</u>	<u>Condition FY2000</u>	<u>Condition FY1999</u>
3	GP	CG	M	75	C3	C3
4	GP	Misc-M	M	75	C3	C3
5	GP	HFG	M	75	C3	C3
6	GP	Misc-M	M	75	C3	C3
A	GP	Yard Aux-M	S	75	C3	C3
B	GP	AGOR	S	75	C3	C3
C	GP	T-AGOS	S	50	C3	C3
D	SC	LCM	S	12	C3	C3

Appendix E Readiness Condition of Naval Station Roosevelt Roads Puerto Rico

<u>Pier or Berth Name</u>	<u>Berth Type</u>	<u>Ship Type</u>	<u>Berth Size</u>	<u>Pier Width</u>	<u>Condition FY2000</u>	<u>Condition FY1999</u>
Bulkhead Charlie	SP	Visiting Ship-M	S	60	C3	no report
FPB1	FL	AOE/AOR	M	50	C3	C2
FPB2	FL	AOE/AOR	M	50	C3	C2
P1B1	GP	Misc-S	M	34	C2	C2
P2B1	GP	HFG	M	38	C2	C2
P2B2	GP	HFG	M	38	C2	C2
P3B1	GP	DD/DDG	M	120	C2	C2
P3B2	GP	DD/DDG	M	120	C4	C2
P3B3	GP	SSBN	M	120	C2	C2
P3B4	GP	Visiting Ship-L	M	120	C4	C2

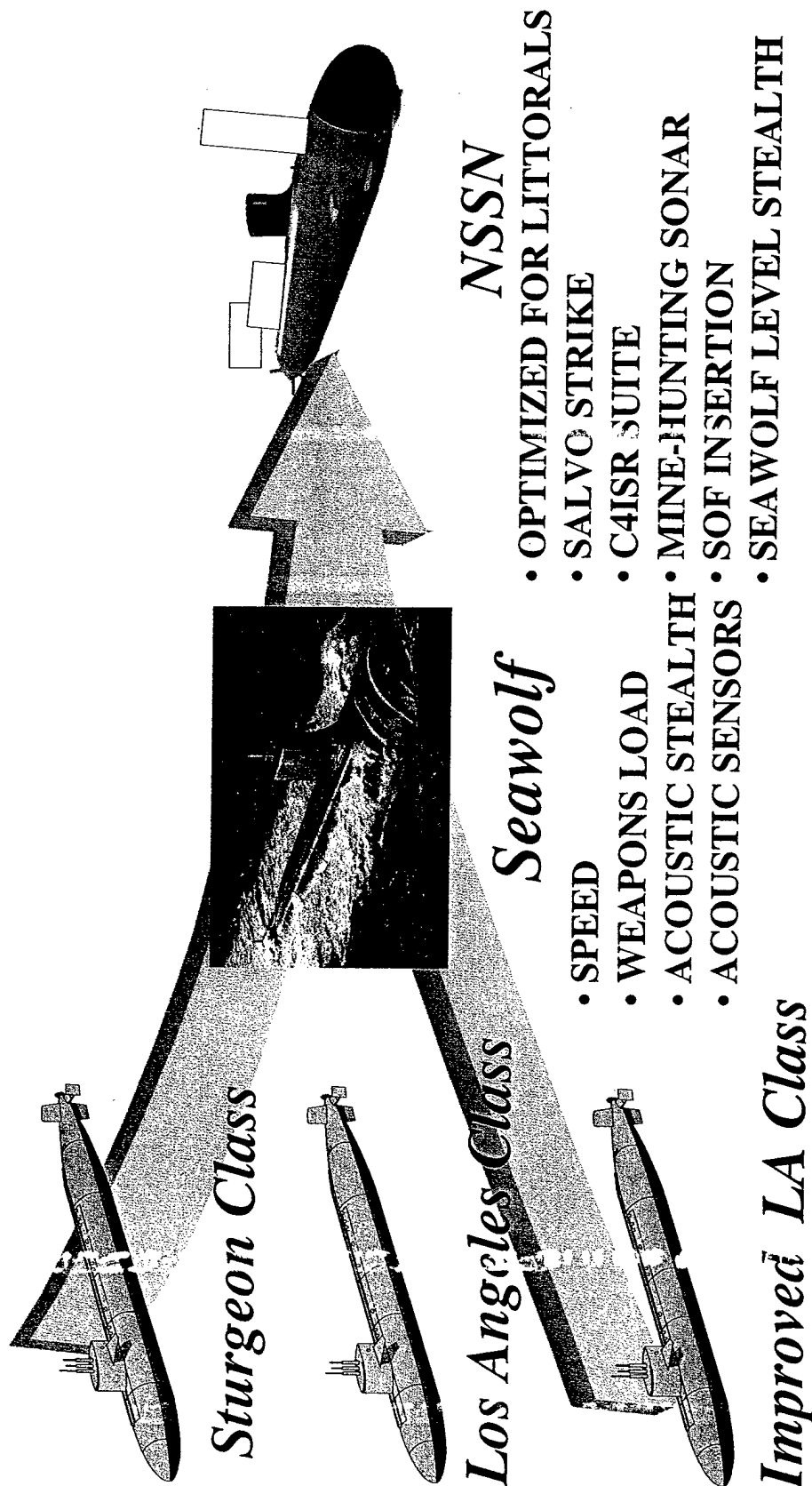
Surface Combatant Evolution

Appendix F Evolution of the Surface Platform



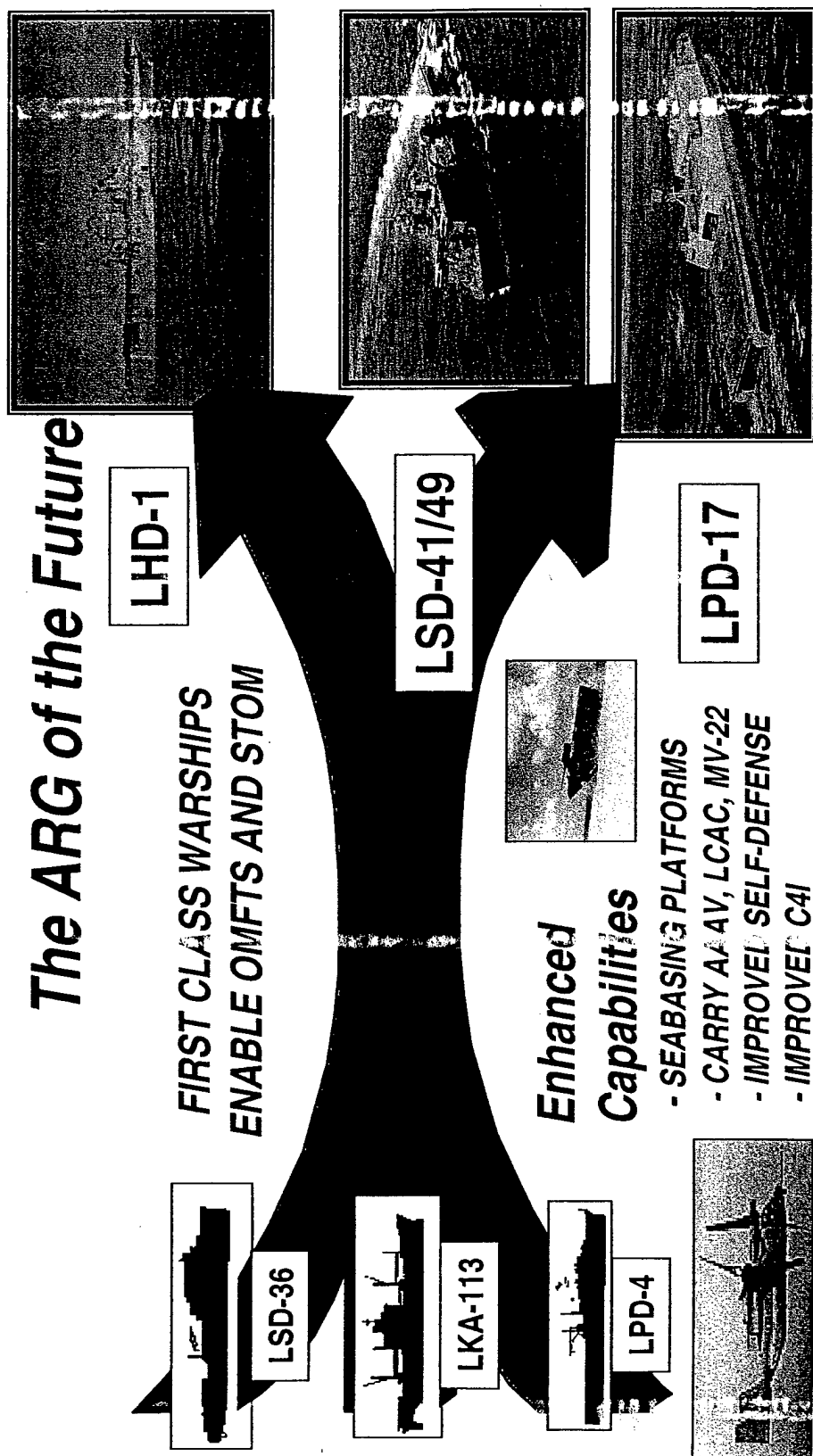
Submarine Evolution

Appendix G Evolution of the Submarine Platform



AMPHIBIOUS FLEET EVOLUTION

Appendix H Evolution of the Amphibious Platforms



AD NUMBER		DATE 13 AUG 01	DTIC ACCESSION NOTICE
1. REPORT IDENTIFYING INFORMATION		<div style="text-align: center; font-size: 2em; font-weight: bold;">20010816 036</div>	
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B. REPORT TITLE AND/OR NUMBER		DTIC: 1. Assign A 2. Return A	
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C. MONITOR REPORT NUMBER			
BY CHRISTOFER M. COLLINS, UNIV OF SO CAROLINA			
D. PREPARED UNDER CONTRACT NUMBER			
N62271-97-G-0071			
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